Medicine Quiz 8

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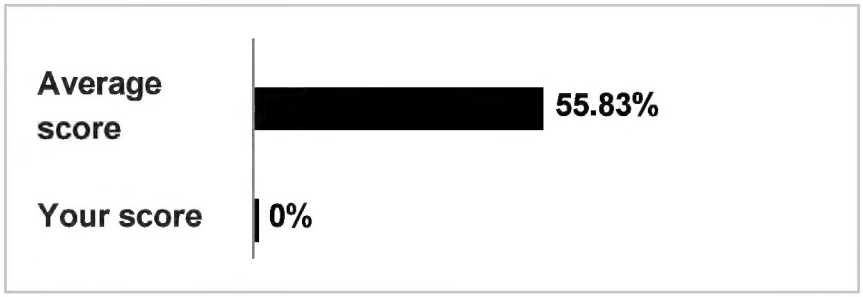

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Answered Review

1. Question

1 points

A 61 year old man is hospitalized after receiving an implantable cardiac defibrillator (ICD). The patient has a long history of coronary disease and sustained an anterior wall myocardial infarction 3 years ago. Two weeks ago, he had an episode of pulseless ventricular tachycardia and was successfully resuscitated. This episode led to the ICD placement. In addition to the ICD, the cardiologist also plans to initiate antiarrhythmic therapy with amiodarone. Which of the following is the most important side effect of this therapy?

1. Hypotension
2. Pulmonary fibrosis ✔
3. Prolongation of the QT interval
4. Recurrent ventricular arrhythmia
5. Skin discoloration

INCORRECT ✖

The correct answer is 2.

Amiodarone is a class III antiarrhythmic agent with many electrophysiologic effects, as well as a number of potential side effects. The most feared side effect, causing the greatest amount of long-term morbidity and mortality, is pulmonary fibrosis, occurring in up to 17% of patients in some series (average 10%). The incidence is clearly related to the total daily dosing, which is taken into account when the drug is prescribed.

(Choice 1) is common with the IV formulation of this drug but, once past the loading dose, is usually not an issue.

(Choice 3) is very common with amiodarone therapy and could lead to a polymorphic ventricular arrhythmia termed "Torsades de Pointes, "However, the incidence of Torsades among patients on amiodarone with prolonged QTs is very low, less than 1 %.

(Choice 4) is a problem for any patient who has had a previous arrhythmia. In theory, amiodarone at therapeutic levels will decrease, but not eliminate, the possibility of recurrence.

(Choice 5) is a common occurrence with this medication but, despite its cosmetic appearance, is not a significant issue for the patient.

2. Question

1 points

A 32 year old woman is referred to a neurologist for evaluation of unsteady gait and numbness in the right foot. Examination reveals weakness of the right lower extremity with muscle spasticity and decreased vibratory sensation. MRI studies show cerebral and spinal cord changes suspicious for

demyelinating lesions. A lumbar puncture is performed for examination of CSF. Which of the following CSF findings would be most consistent with a diagnosis of demyelinating disorder?

1. Elevated protein with marked lymphocytosis
2. Elevated protein with normal cell count
3. Marked neutrophilic leukocytosis with reduced glucose
4. Mildly increased protein with oligoclonal IgG bands ✔
5. Normal protein with mild lymphocytosis

INCORRECT ✖

The correct answer is 4.

Clinical symptomatology and MRI findings constitute the mainstay for the diagnosis of multiple sclerosis, but CSF examination may add confirmatory evidence. An abnormality frequently found in multiple sclerosis is the presence of oligoclonal bands of IgG detected by CSF electrophoresis. This appears to result from activation of lymphocytic subsets directed against specific white matter antigens, such as myelin basic protein. CSF cell count may be normal or slightly elevated.

(Choice 1) is usually associated with viral or mycobacterial meningitis/meningoencephalitis. CSF glucose is normal in viral infections but is reduced in mycobacterial infections.

(Choice 2) is characteristic (but not pathognomonic) of Guillain-Barré syndrome.

(Choice 3) is highly characteristic of bacterial meningitis. Elevated CSP protein would also be present.

(Choice 5) is nonspecific and may develop as a reaction (neighborhood reaction) to intracranial processes, such as abscess, mastoiditis, and tumor.

3. Question

1 points

A 70 year old man is brought to the emergency department by his family because of the rapid onset of right sided weakness and confusion. On arrival, the patient is drowsy, but examination confirms a right hemiparesis associated with left deviation of the eyes. The patient is admitted with a preliminary diagnosis of cerebral infarction. A CT scan of the head performed 12 hours following symptom onset reveals changes consistent with ischemic necrosis in the territory of the middle cerebral artery. The patient's neurologic status deteriorates rapidly on the third hospital day, and he lapses into coma. He dies the next day. An autopsy confirms a large infarct in the territory of the middle cerebral artery, associated with massive swelling of the left hemisphere, transtentorial herniation, and pontine Duret hemorrhages. Which of the following treatments might have prevented such an outcome?

1. Anticoagulants
2. Barbiturates
3. Calcium channel blockers
4. Corticosteroids ✔
5. NMDA receptor antagonists

INCORRECT ✖

The correct answer is 4.

The edema (swelling) that develops around a cerebral infarct becomes particularly pronounced 48-72 hours following ischemic necrosis and may be of massive proportions if infarction is extensive. This leads to increased intracranial pressure, often resulting in cerebral herniations. Duret hemorrhages along the midline of the pons are secondary to transtentorial (uncal) herniation. Corticosteroids, such as prednisone (up to 100 mg/day) and dexamethasone (16 mg/day), are used to reduce cerebral edema following brain infarction and prevent herniation syndromes.

(Choice 1) Anticoagulants are not used in the acute management of stroke unless there is a proven source of thromboemboli, such as cardiac disease (e.g., atrial fibrillation and mitral valve prolapse). Heparin is the drug of choice. Anticoagulation can be started only if intracerebral hemorrhage has been ruled out by CT.

(Choices 2,3 & 5) Several compounds that may minimize death of hypoxic neurons in the "penumbra" of the infarcted region have been used or are under investigation. These compounds include barbiturates, which diminish neuronal metabolism and energy requirements; calcium channel blockers, such as nimodipine, which have been shown to reduce neurologic deficits from stroke; and drugs that block receptors for glutamate, such as NMDA receptor antagonists, which seem to reduce infarct extent in experimental models.

4. Question

1 points

A 60 year old woman is hospitalized with a severe case of pneumonia that is treated with cephalosporins. Her condition improves over the course of therapy, and after 6 days, she develops loose stools that progresses to frequent bouts of foul-smelling, watery diarrhea with small amounts of blood over the course of 10 hours. There is associated abdominal pain, nausea and vomiting, fever, leukocytosis, and hypotension. Physical examination reveals diffuse pain on palpation, and an abdominal x-ray shows marked dilatation of the transverse colon and mucosal edema. Sigmoidoscopy is performed and reveals diffuse pseudomembranes over the colon that reveal an erythematous, inflamed muscosa when removed. Which of the following is this patient at greatest risk for?

1. Colon cancer
2. Colonic perforation ✔
3. Fistula formation
4. Gangrenous necrosis
5. Hemorrhage

INCORRECT ✖

The correct answer is 2.

This woman has antibiotic associated pseudomembranous colitis, which has resulted in toxic megacolon, a known complication of severe pseudomembranous colitis. The causative organism of this colitis is Clostridium difficile, a gram-positive, spore-forming, anaerobic bacillus that overgrows in the setting of broad-spectrum antibiotic use, especially clindamycin, amoxicillin, ampicillin, or cephalosporins. Symptoms range from loose stools in the mildest cases to toxic megacolon (fever, nausea, vomiting, and ileus) and colonic perforation (rigid abdomen, rebound tenderness) in the most severe cases. In most cases, the diagnosis can be made on clinical grounds without the need for colonoscopy. If colonoscopy is performed, it may show either a nonspecific colitis or, in severe cases, pathognomonic pseudomembranes. Many cases occur after antibiotic use (of up to 6 weeks). Mild cases resolve with the discontinuation of antibiotics, but severe cases require treatment with oral metronidazole (first line of therapy) or oral vancomycin (in resistant cases) to prevent toxic megacolon and resultant colonic perforation. Two thirds of patients with toxic megacolon require surgical intervention.

(Choice 1) is not associated with pseudomembranous colitis. There is a significantly higher risk in patients who have had ulcerative colitis for more than 10 years, a family history of colon cancer, or a history of multiple colonic polyps.

(Choices 3 & 5) The formation of fistulas and colonic hemorrhages are complications of diverticular disease. This patient's condition was not diverticulitis, and because this patient did not show evidence of diverticular disease on colonoscopy, it is unlikely that either of these complications will occur.

(Choice 4) is not a complication of pseudomembranous colitis. It may occur as a complication of mesenteric vessel occlusion. Typically, gangrenous necrosis is found in a patient with an underlying cause of embolism or atherosclerosis, and there is often a history of abdominal pain after eating (mesenteric angina). However, there is no association with antibiotic use, and the presence of pseudomembranes on endoscopy confirms a different diagnosis.

5. Question **1 points**

A 35 year old man with a history of chronic hepatitis B presents to the emergency department with severe abdominal pain. The patient states that he has had intermittent fevers and a 15-lbweight loss over the past 6 months. His temperature is 38 C (100.4 F), blood pressure is 160/120mm Hg, pulse is 60/min, and respirations are 15/min. Abdominal examination demonstrates guarding and diffuse pain. Examination of his legs is remarkable for purpura and several distinctive pea-sized nodules along the course of superficial arteries. The erythrocyte sedimentation rate is 30 mm/hr. Urinalysis reveals proteinuria, hematuria, and proteinaceous casts. Biopsy of one of the pea-shaped lesions of the leg would likely show which of the following in vessels walls?

1. Atherosclerotic plaques
2. Fungal hyphae
3. Giant cells
4. Granulomas
5. Neutrophils ✔

INCORRECT ✖

The correct answer is 5.

The disease is polyarteritis nodosa (PAN). This vasculitis of medium-sized arteries can occur at any age and has a 2: 1 male predominance. An important feature of the vasculitis is its spotty distribution, with individual lesions involving typically only 1 cm or shorter lengths of blood vessel. Some patients have hepatitis B antigenemia, and it is suspected that circulating immune complexes related to the chronic hepatitis may trigger the vasculitis. Diagnosis can be difficult because a variety of organ systems may be affected. Most patients have nonspecific constitutional findings, including hypertension, weight loss, fever, and elevated erythrocyte sedimentation rate (a marker for chronic disease with an immune component). Many patients seek medical attention because of an acute abdomen or gastrointestinal bleeding. Other presentations involving other systems, such as myocardial infarction, progressive renal failure, or infarction of individual abdominal organs, can occur. Urinalysis may be helpful in that the findings may suggest the possibility of multisystem disease. Particularly helpful, if present, are distinctive pea-shaped nodules along the superficial arteries of the legs. The nodules may be accompanied by vasculitic purpura, urticaria, or even subcutaneous hemorrhage with gangrene. Microscopically, the acute lesions of PAN show fibrinoid necrosis and neutrophil infiltration into the vessel wall. With healing, the infiltrating cell population shifts to macrophages and plasma cells. In the healed lesion, residual damage in the form of vessel wall fibrosis and fragmentation of the internal elastic membrane can be seen.

(Choice 1) severe enough to cause the patient's symptoms would be unusual in a 35 year-old man. Atherosclerotic plaques most often involve the aorta and the more proximal regions of its branches.

(Choice 2) Associate fungal hyphae with Aspergillus, or less frequently with Candida, both of which can destroy blood vessels, most often in patients with underlying immunosuppression.

(Choice 3) Associate giant cells with giant cell (temporal) arteritis, which most commonly involves the arteries of the head, notably the temporal and ophthalmic arteries.
(Choice 4) Associate granulomas of blood vessels with giant cell arteritis, Churg-Strauss syndrome, and Wegener granulomatosis.

6. Question

1 points

A 22 year old woman presents with a 1-weekhistory of an itchy rash, which manifested a few weeks after coming back from a trip with her friends. One of the friends has developed a similar rash. The patient reports that the itching keeps her awake at night. Physical examination reveals a linear papulovesicular eruption along the waist line, axillary folds, and finger webs. Linear burrows are evident on close inspection. Which of the following is the most appropriate next step in diagnosis?

1. Microscopic examination of skin scrapings obtained after placing oil on lesions ✔
2. Microscopic examination of skin scrapings treated with potassium hydroxide
3. Measurement of serum IgE levels
4. Allergen challenge tests
5. Skin biopsy

INCORRECT ✖

The correct answer is 1.

The symptomatology and findings on physical examination are strongly suggestive of scabies, due to infestation by Sarcoptes scabiei. This mite is acquired by direct contact with an infected person and penetrates into the skin, producing burrows that are visible on close (or hand lens) examination. The areas of the body most frequently affected include the axillary and genital regions, waistline, and finger webs. Pruritus tends to be particularly intense at night. The most effective way to confirm a diagnosis of scabies is to place a drop of mineral oil on a suspected area (one of the burrow holes), then unroof the burrow hole with a curette ring and obtain scrapings that are examined under a microscope.
(Choice 2) Microscopic examination of skin scrapings treated with potassium hydroxide is the method of choice to demonstrate fungal organisms in skin lesions. To perform this test, skin scrapings are obtained by using a ring curette or a #15 blade. The scrapings are placed on a glass slide and treated with a drop of 10 to 20% KOH. After a few minutes, a cover slip can be applied on the glass slide, and the preparation examined under the microscope or a magnifying lens. Hyphae and spores can be identified. KOH treatment is necessary to dissolve the keratin.

(Choices 3 & 4) Measurement of serum IgE levels and allergen challenge tests are appropriate investigations when an allergic disorder is suspected. Clinical history and physical examination clearly indicate that this is not the case.
(Choice 5) is an invaluable investigative tool that should be resorted to when the clinical approach (i.e., history and objective findings) is insufficient to reach a diagnosis. Scabies can be easily diagnosed without resorting to biopsy.

7. Question

1 points

A 35 year old man comes to the emergency department because he is experiencing palpitations and is afraid he is having a heart attack. On questioning, the patient has had a number of these episodes in the past few months, although the present one is the worst. His temperature is 37 °C (98.6 °F), blood pressure is 170/135 mm Hg, pulse is 140/min, and respirations are 17/min. Physical examination is remarkable only for diaphoresis. Within the hour, before definitive therapy is begun, the patient's blood pressure drops spontaneously to 140/85 mm Hg, and his symptoms improve. Measurement of which of the following in a 24-hour urine collection is most likely to confirm the probable diagnosis?

1. 17-Hydroxycorticosteroids
2. Porphobilinogen
3. Pregnanediol
4. Tetrahydrocortisol
5. Vanillylmandelic acid ✔

INCORRECT ✖
The correct answer is 5.
Pheochromocytomas are rare neoplasms of the adrenal medulla (or of extra-adrenal sites) that produce epinephrine and/or norepinephrine, thereby causing episodic or continuous hypertension. Since the epinephrine and norepinephrine secretion tends to be episodic, plasma levels of these hormones may be normal. Therefore, it has become customary to look for metabolites of epinephrine and norepinephrine in 24-hour urine collections, thereby averaging out the periodicity. The specific compounds analyzed are the metanephrines, vanillylmandelic acid (VMA), and homovanillic acid (HVA).
(Choice 1) include cortisol, cortisone, and 11-deoxycortisol. These steroid hormones are unrelated to the amino-acid-derived structure of epinephrine and norepinephrine.
(Choice 2) is a porphyrin precursor that is elevated in some of the porphyrias.
(Choice 3) is a metabolite of the steroid hormone progesterone.
(Choice 4) is a derivative of the steroid cortisol that is found in urine.

8. Question

1 points

A 55 year old white man presents to the emergency department with severe abdominal pain that has been radiating through to his back for the past 2 days. The man appears acutely ill and is sitting in a markedly bent-over position, holding his arms over his abdomen. The patient state that this posture makes him feels slightly better, and comments that sudden movements and deep breathing make the pain worse. He has also been throwing up, even when there is nothing in his stomach. He describes the pain as "terrible" and begs for narcotics. On questioning, he admits to heavy drinking for the past 5 or 10 years. He denies use of street drugs. His temperature is 38.1 °C (100.6 °F), blood pressure is 85/60 mm Hg when lying down and 60/45 mm Hg when sitting, pulse is 120/min and regular, and respirations are 22/min and shallow. His lungs are clear to auscultation. Pressure on the upper portion of the abdomen intensifies the pain. Examination of the extremities reveals multiple bruises but no needle marks. The liver edge can be felt and has a nodular character. A complete blood count shows an erythrocyte count of 3.5 million/mm^3, white blood cell count of 18,000/mm^3 with predominately neutrophils and increased band forms, and a platelet count of 200,000/mm^3. Which of the following is the most appropriate next step in diagnosis?

1. Blood urea nitrogen
2. Chest x-ray
3. Serum amylase level ✔
4. Serum transaminase levels
5. Esophagogastroduodenoscopy

INCORRECT ✖

The correct answer is 3.

This case illustrates a fairly classic presentation of acute pancreatitis. These patients often have a history of either alcohol abuse or gallstone disease. Alcohol intake greater the 100 g/day favors precipitation of protein of the pancreatic enzymes within the ducts, which eventually (over a period of years) cause enough blockage to trigger pancreatitis. The pain described in the question stem is typical of acute pancreatitis, but some patients with more chronic disease may have surprisingly little pain. Very early in the disease, the patient's temperature may be subnormal, but fever usually develops within a few hours of onset. An elevated white count is usually present. The most helpful laboratory tests are serum amylase and serum lipase, elevations of which are considered strongly supportive of a diagnosis of pancreatitis.

(Choice 1) is a marker for renal dysfunction.

(Choice 2) might show pneumonia but would probably not be helpful in this patient with clear lungs.

(Choice 4) may very well be elevated in this alcoholic patient, but his most significant acute problem is his pancreatitis, not his probably damaged liver.
(Choice 5) might show peptic ulcer disease, but severe pain would usually be seen only with perforation, and the patient would probably be vomiting blood in that setting.

9. Question **1 points**

A 40 year old woman presents to the physician because of increased nervousness for the past 3 months. She reports insomnia, frequent palpitations without an identifiable cause, and weakness. She has no significant past medical history and takes no medications. Vital signs are remarkable for a blood pressure of 150/60 mm Hg and a pulse of 135/min. She appears anxious, and despite being in the middle of winter, is dressed in a t-shirt and shorts. Physical examination reveals proptosis and eyelid retraction, moist skin, mild hand tremor, and a palpable diffuse goiter. Which of the following is the most likely diagnosis?

1. Euthyroid sick syndrome
2. Follicular carcinoma of the thyroid
3. Graves disease ✔
4. Hashimoto thyroiditis
5. Subacute thyroiditis

INCORRECT ✖
The correct answer is 3.
This patient is exhibiting the classic presentation of hyperthyroidism. Other signs and symptoms that may be seen include atrial fibrillation, nervousness, increased appetite, weight loss, frequent bowel movements, diplopia, conjunctival injection, and pretibial myxedema. The most common cause of hyperthyroidism is Graves's disease (diffuse toxic goiter); in fact, infiltrative ophthalmopathy (as well as pretibial myxedema) is a specific autoimmune manifestation of Graves's disease. The disease has an autoimmune basis, with antibodies directed against the TSH receptors, causing continuous thyroid gland stimulation.
(Choice 1) causes asymptomatic thyroid hormone alterations, usually in patients with serious systemic disease.
(Choice 2) usually does not cause hyperthyroidism.
(Choice 4) can cause transient hyperthyroidism early in its course, but this is uncommon compared with Graves's disease.
(Choice 5) usually causes striking thyroid gland tenderness and may cause transient hyperthyroidism.

10. Question **1 points**

A malnourished and dehydrated 54 year old man with a history of alcoholism is brought to the emergency department. His temperature is 36.9 C (98.4 F), blood pressure is 105/65 mm Hg, pulse is 98/min, and respirations are 14/min. Neurologic assessment reveals decreased reflexes and sensation in the legs, and an ataxic gait. On admission, laboratory tests show:

Albumin: 2.9 g/dL
Sodium: 105 mEq/L
Potassium: 3.9 mEq/L
Chloride: 101 mEq/L
Plasma osmolality: 256 mOsm/kg
Na fractional excretion: <0.5%

He is treated with parenteral administration of 100 mg of thiamin and IV infusion of isotonic saline and glucose. Twelve hours after treatment is started, the patient becomes quadriplegic and mute, although he appears to be able to communicate by slow eye blinking. A blood sample at this time shows the following values:

Sodium: 126 mEq/L
Potassium: 4.0 mEq/L
Chloride: 105 mEq/L

Despite adequate therapeutic interventions, the patient dies on the third hospital day. Which of the following postmortem findings will most likely be obtained at autopsy?

1. Alzheimer type 2 glia, consistent with hepatic encephalopathy
2. Central pontine myelinolysis ✔
3. Cerebellar vermis atrophy
4. Subacute combined degeneration of the spinal cord
5. Wernicke encephalopathy

INCORRECT ✖

The correct answer is 2.

The clinical picture is consistent with a "locked-in" state that can be caused by central pontine myelinolysis. This condition consists of acute demyelination of the basilar pons, resulting in interruption of the corticobulbar (excluding the fibers to cranial nerve nuclei1-N) and corticospinal tracts with preservation of sensory input. The patient can close his eyes by inhibition of the levator palpebrae muscle, innervated by the oculomotor nerve. One of the

most common causes of this disorder is excessively rapid correction of hyponatremia. To prevent this complication, it is recommended that the increase in serum sodium level should not exceed 1 mEq/L/hr or 25 mEq/L with in the first day of therapy.
(Choice 1) Alzheimer type 2 glia refers to modified astrocytes that develop in patients with chronic liver failure. Hepatic encephalopathy is certainly a consideration in an alcoholic patient, but it would manifest with mental status changes and characteristic flapping tremor (asterixis) without paralysis.
(Choice 3) Cerebellar vermis atrophy may be due to chronic alcoholism and is responsible for the ataxic gait frequently seen in chronic alcoholics.
(Choice 4) Subacute combined degeneration of the spinal cord results in ataxia, numbness, and spastic paresis of the lower extremities.
(Choice 5) manifests with nystagmus, ophthalmoparesis, and confusion. Both disorders are related to thiamin deficiency.

11. Question

1 points

A 64 year old man is brought to the emergency department because of sudden onset of tearing chest pain that seems to originate in the anterior chest and radiate to the back in the interscapular region. A few weeks ago, he had a dental abscess, which resolved with extraction followed by a full course of ampicillin. On examination, he is oriented to person, place, and time; however, he appears in acute distress, is diaphoretic, and is breathing with difficulty. His temperature is 37.1 C (98.8 F), blood pressure is 174/68mm Hg, pulse is 206/min, and respirations are 25/min. There is no jugular vein distention or hepatomegaly. Auscultation reveals a diastolic murmur along the left sternal border. The lungs are clear to auscultation. The ECG shows no signs of myocardial ischemia. A chest x-ray film demonstrates widening of the mediastinum. Which of the following is the most likely diagnosis?

1. Aortic dissection ✔
2. Acute mediastinitis
3. Acute pericarditis
4. Cardiac tamponade
5. Myocardial infarction

INCORRECT ✖

The correct answer is 1.

A tearing, excruciating chest pain that radiates to the back should always generate the clinical suspicion of aortic dissection involving the aortic arch. The patient presents with extreme signs of distress. Aortic insufficiency, with its associated diastolic murmur and

widened pulse pressure, frequently develops. A discrepancy in blood pressure or pulse between the right and left arms is an additional supporting sign. Mediastinal widening is often seen on chest x-ray, but the diagnosis should be confirmed by CT or MRI scans. Hypertension is the most common predisposing factor, but Marfan syndrome is a classic condition associated with aortic dissection.
(Choice 2) is a rare infectious complication due to extension of suppurative processes from adjacent cervical organs (e.g., peritonsillitis, thyroiditis) or perforation of the esophagus or trachea. The patient has chest pain but lacks fever and other systemic signs of infections. The history of a recent dental abscess should not deceive you.
(Choices 3 & 4) Acute pericarditis produces chest pain, which is gradual in onset and usually accompanied by a friction rub. If pericardial effusion is particularly abundant, cardiac tamponade may ensue. The latter will result in acute signs and symptoms of cardiac failure, necessitating emergency pericardiocentesis to relieve the pressure on the heart.
(Choice 5) is probably the most important differential diagnosis to consider in case of aortic dissection, but the absence of ECG changes suggesting myocardial ischemia argues against it in this patient.

12. Question

1 points

A 25 year old man is admitted to a burn unit after an automobile accident in which he lost consciousness and then was burned over 65% of his body. Two days after his accident, the nurse notices that small amounts of blood are returned through his nasogastric tube when she checks it prior to administering fluids. Endoscopy shows multiple, tiny to small (2-20 mm in diameter) ulcers in the corpus of the stomach. Which of the following is the most likely diagnosis?

1. Acute erosive gastritis ✔
2. Chronic erosive gastritis
3. Gastric atrophy
4. Nonerosive gastritis
5. Superficial gastritis

INCORRECT ✖

The correct answer is 1.

This is acute erosive gastritis, or “stress” gastritis, which is important to diagnose early because it can cause fatal gastrointestinal bleeding. Patients who develop this condition are usually already severely ill and very vulnerable to the problems of acute hemorrhage. Risk factors include severe burns, CNS trauma, sepsis, shock, and other organ system failure (respiratory, liver, renal, or multi-organ). Less severely ill patients may develop acute erosive

gastritis as a complication of drug therapy [particularly nonsteroidal anti-inflammatory drugs (NSAIDs)] or alcohol use. The pathogenesis of acute erosive gastritis in severely ill patients is thought to involve decreased mucosal defense mechanisms and localized mucosal ischemia, possibly compounded by acid hypersecretion (particularly in burns, CNS trauma cases, and sepsis), which promotes mucosal damage. Because of the potential seriousness of the condition, most intensive care units use measures such as early enteral feeding, IV H2 blockers, or antacids to prevent it.
(Choice 2) can be seen with drugs (aspirin and NSAIDs), Crohn disease, and viral infections. It is characterized by punctate lesions on the ridges of thickened rugal folds by endoscopy.
(Choice 3) is a nonerosive lesion of the stomach with mucosal atrophy that can complicate long-standing gastritis of various etiologies. It can also occur in connection with autoantibodies to parietal cells, producing pernicious anemia.
(Choice 4) is related to Helicobacter pylori infection characterized by inflammation through the entire mucosa.
(Choice 5) is a nonerosive, and often asymptomatic, mild form of gastritis related usually to H. pylori infection.

13. Question

1 points

A 29 year old man consults a physician because he has developed chronic weakness and fatigue. He also feels dizzy when he first stands up in the morning. On further questioning, he reports cold intolerance and frequent urination. Physical examination is notable for facial puffiness; coarse, sparse, hair; and a hoarse voice. Laboratory studies show:

Sodium: 125 mEq/L
Potassium: 5.5 mEq/L
Bicarbonate: 25 mEq/L
Urea nitrogen (BUN): 22 mg/dL
Serum glucose: 380 mg/dL
Thyroid-stimulating hormone (TSH): 9.5 IU/mL

Which of the following is the most likely diagnosis?

1. Multiple endocrine neoplasia (MEN), type I
2. MEN, type IIA
3. MEN, type IIB
4. Polyglandular deficiency syndrome, type I
5. Polyglandular deficiency syndrome, type II ✔

INCORRECT ✖

The correct answer is 5.

The polyglandular deficiency syndromes are autoimmune disorders that cause subnormal functioning of several endocrine glands concurrently. This patient has the type II variant, which has peak incidence at age 30 and always involves the adrenal cortex. Thyroid and pancreatic islet involvement, producing type 1 diabetes mellitus, are also common. In this patient, adrenocortical insufficiency is suggested by the cluster of serum sodium 5 mEq/L, plasma bicarbonate 20 mg/dL. Diabetes mellitus is suggested by the polyuria and the blood glucose of 380 mg/dL. Hypothyroidism is suggested by the elevated TSH. Patients with polyglandular deficiency syndrome, type II, may also present with transient hyperthyroidism secondary to destruction of follicles in the thyroid gland.

Other features of the condition include antibodies directed against the target glands, particularly against cytochrome P_{450} adrenal cortical enzymes, and reduced systemic T-cell-mediated immunity.

(Choice 1) is characterized by tumors of the parathyroid glands, pancreatic islet cells, and pituitary gland.

(Choice 2) is characterized by medullary carcinoma of the thyroid, pheochromocytoma, and hyperparathyroidism.

(Choice 3) is characterized by multiple mucosal neuromas, marfanoid habitus, medullary carcinoma of the thyroid, and pheochromocytoma.

(Choice 4) is characterized by onset in childhood or before age 35, hypoparathyroidism, adrenocortical failure, and gonadal failure; diabetes mellitus is not usually seen with this condition.

14. Question

1 points

A 55 year old white man is taken to the emergency department because he is vomiting fresh blood. For the past several hours, he had been vomiting, then dry heaving; 30 minutes ago, he suddenly started vomiting fresh blood. The patient's temperature is 38.6 C (96 F), blood pressure is 110/55 mm Hg, pulse is 75/min, and respirations are 16/min. Endoscopy demonstrates several lacerations in the mucosa near the gastroesophageal junction. Which of the following underlying conditions is likely present in this patient?

1. AIDS
2. Alcoholism ✔
3. Chagas disease
4. Diabetes mellitus
5. Scleroderma

INCORRECT ✖

The correct answer is 2.

These tears, called Mallory Weiss lacerations, account for about 5% of cases of upper gastrointestinal hemorrhage. They occur when the proximal part of the stomach is telescoped into the distal esophagus (stretching and tearing it) by severe vomiting, severe retching, or severe hiccups. The lacerations are usually superficial and often stop bleeding spontaneously. If the bleeding fails to stop spontaneously, the lacerations may be controlled endoscopically. The condition was initially described in alcoholics, but you should be aware that it occasionally occurs in many other types of patients as well.

(Choice 1) can predispose for esophagitis due to viruses (CMY, herpes) or fungi (usually Candida).

(Choices 3 & 4) Chagas disease can cause megaesophagus. Diabetes mellitus can predispose for fungal (particularly Candida) esophagitis.

(Choice 5) can involve the esophagus with fibrosis, leading to dysphagia.

15. Question **1 points**

A 34 year old woman undergoes clinical investigations because of chronic dyspeptic symptoms, such as mild nausea, bloating after meals, and mild right upper abdominal pain. She is otherwise healthy and takes oral contraceptives only. Physical examination and laboratory studies are normal. Liver ultrasonography reveals a S-cm, well-circumscribed mass in the right hepatic lobe. A percutaneous needle biopsy shows a lesion consistent with hepatic adenoma. When symptomatic, which of the following is the most common clinical presentation of this tumor?

1. Abdominal pain
2. Jaundice
3. Metastatic disease
4. Portal hypertension
5. Rupture into peritoneal cavity ✔

INCORRECT ✖

The correct answer is 5.

Liver adenoma is an infrequent benign tumor composed of hepatocytes arranged with the same lamellar pattern as the normal hepatic lobule. It is usually clinically silent and occurs most frequently in association with oral contraceptives or anabolic steroids. When symptomatic, its most common clinical presentation is rupture into the peritoneal cavity with consequent hemoperitoneum and shock.

(Choice 1) is a symptom of many hepatobiliary diseases, including hepatitis, carcinoma, and cholelithiasis. The pain of hepatic origin is presumed to result from stretching of the capsule as occurs in acute hepatitis. The pain of biliary origin derives from acute distention of the gallbladder, usually because of gallstones blocking the cystic or common bile duct.
(Choice 2) is not a manifestation of liver adenoma. Hemolytic disorders, diffuse hepatocellular damage, and obstruction of the biliary pathways are the most common conditions resulting in jaundice.
(Choice 3) is not a consequence of liver adenoma, which is a benign tumor. Liver adenoma, however, may be extremely similar histologically to well-differentiated hepatocellular carcinoma, so that one may be mistaken for the other.
(Choice 4) may result from prehepatic causes (thrombosis of the portal vein), hepatic causes (cirrhosis or other diffuse infiltrative conditions), and post-hepatic causes (obstruction of the hepatic veins or right-sided cardiac failure). Well-demarcated tumors, such as liver adenoma, do not lead to portal hypertension.

16. Question

1 points

A 40 year old man presents with the acute onset of severe pain in his left great toe for the past 24 hours. He denies trauma, fever, chills, or changes in appetite. He is a chronic smoker but does not abuse alcohol. He is currently on day 4 of a course of erythromycin for bronchitis. Examination shows his blood pressure is 120/80 mm Hg, pulse is 80/min, and respirations are 18/min. The left great toe is red, swollen, and tender to touch, with no fluctuation. Laboratory evaluation shows the following:

Sodium: 139 mEq/L
Potassium: 4.5 mEq/L
Hemoglobin: 13.S g/dL
Leukocytes: 9000/mm^3
Platelets: 350,000/mm^3
Uric acid: 14 mg/dL

Which of the following is the most appropriate initial step in management?

1. Allopurinol
2. Colchicine
3. Indomethacin ✔
4. Intra-articular corticosteroids
5. Probenecid

INCORRECT ✖

The correct answer is 3.

The classic presentation, along with the hyperuricemia, makes gouty arthritis the most likely diagnosis. Nonsteroidal anti-inflammatory drugs (NSAIDs) are the treatment of choice of acute gouty arthritis. They are somewhat less specific than colchicine for gout but are better tolerated and work quickly.

(Choice 1) is used in the intercritical period between attacks, not in acute attacks.

(Choice 2) is effective for acute gouty arthritis but is poorly tolerated at the high, frequent doses required for an acute attack.

(Choice 4) can be used in an acute episode, but not before a trial with NSAIDs and/ or colchicine is attempted.

(Choice 5) is a uricosuric agent used in the intercritical period, not during acute attacks, in patients who are under excreter of uric acid.

17. Question

1 points

A 38 year old engineer presents with complaints of epistaxis, severe sinus pain, and purulent sinus drainage over the past 6 months. One year ago, he had frequent episodes of cough, and a chest x-ray film obtained at that time showed pulmonary infiltrates. He recalls that his cough was poorly responsive to antibiotics. The man also admits to general weakness and diffuse muscle aches. Over the past 8 months he has lost more than 5 kg (10 lb). The patient has no other medical problems, denies smoking, is not taking any medications, and reports no other symptoms. On physical examination, his lungs are clear without wheezing or rhonchi. Small ulcerative lesions are apparent on his nasal septum, and many tender subcutaneous nodules are present on his back and arms. Laboratory values are as follows:

Erythrocyte
Sedimentation rate: 66mm/h
Leukocytes: 12,000/mm^3 (70% segmented neutrophils, 20% lymphocytes, 10% monocytes)
Hemoglobin: 13 g/dL
Hematocrit: 41%

A chest x-ray film is obtained that shows multiple 1- to 2-cm nodules in both upper lung fields. Which of the following is most likely to confirm the diagnosis?

1. Antiribonucleoprotein
2. Elevated serum IgE
3. Positive antiglomerular basement membrane antibody
4. Positive c-ANCA ✔
5. Positive p-ANCA

INCORRECT ✖

The correct answer is 4.

Wegener granulomatosis is a vasculitis that affects the upper respiratory tract and paranasal sinuses, the kidneys, and the lungs. It is associated with dermatologic symptoms (subcutaneous nodules and purple papules).Antineutrophil cytoplasmic antibodies yielding a cytoplasmic immunofluorescence pattern (c-ANCA) are found in more than 90% of patients with Wegener granulomatosis.

(Choice 1) is found in high titer levels in mixed connective tissue disease (MCTD). MCTD is a distinct rheumatic syndrome characterized by overlapping clinical features of systemic lupus erythematosus, scleroderma, polymyositis or dermatomyositis, and rheumatoid arthritis.

(Choice 2) Elevated levels of serum IgE might be seen in acute bronchopulmonary aspergillosis.

(Choice 3) Goodpasture syndrome is associated with antiglomerular basement membrane antibody. This disorder affects the kidney and lungs, rather than the lungs or paranasal sinuses.

(Choice 5) is seen in polyarteritis nodosa, a nongranulomatous vasculitis. Purple nodules can be seen in both polyarteritis nodosa and Wegener granulomatosis.

18. Question **1 points**

An 87 year old woman with advanced Alzheimer disease is transferred from a nursing home to a hospital unit after deterioration in her condition. Physical examination demonstrates a nearly immobile, emaciated woman with poor skin turgor and a dry mouth. Her temperature is 35.6 C (96 F), blood pressure is 90/60 mm Hg, pulse is 90/min, and respirations are 15/min. Blood chemistry studies demonstrate a sodium of 151 mEq/L, a potassium of 5.3 mEq/L, and a chloride of 112 mEq/L. Which of the following is the most appropriate next step in management?

1. Oral water administration
2. IV 0.9% saline
3. IV 5% D/W ✔
4. IV colloid and 0.9% saline
5. IV distilled water

INCORRECT ✖

The correct answer is 3.
This is a dehydrated and malnourished patient with hypernatremia. The most probable cause is that she is no longer able to express thirst or hunger and cannot cooperate efficiently with caregivers when taking water or food. The most immediate goal of therapy is to replace water. The usual choice in this setting is 5% dextrose in water, which should be given relatively slowly to prevent glucosuria, followed by normal saline. This strategy would increase the salt free water excretion and hypertonicity.
(Choice 1) will work with physically and mentally competent people who have been water deprived (e.g., stranded in the desert). However, this strategy has obviously already failed in this patient (the nursing home was probably not deliberately trying to dehydrate her) and is not the best choice.
(Choice 2) by itself would not be used in this clinical setting.
(Choice 4) is used as the initial hydrating fluid in patients who are in shock secondary to dehydration, but is not needed in this patient with adequate blood pressure and symptomatic hypernatremia.
(Choice 5) should never be given to patients-it will cause red cell lysis.

19. Question **1 points**

A 28 year old man presents to a physician because of sores on his penis and scrotum. He also has lesions in his oral cavity, which began a few days before the sores on his genitalia. He has had several similar episodes in the past, but they resolved before he consulted a physician. During these periods, his eyes often hurt when he goes into bright light. He has also had recent intermittent pain in
his knees. Physical examination demonstrates oral lesions resembling aphthous ulcers, as well as small ulcers on the genitalia. Tzanck smear of the genital and oral ulcers is negative for multinucleated giant cells. Blood studies demonstrate an elevated erythrocyte sedimentation rate (ESR), elevated α-2 and gamma globulins, and mild leukocytosis. Which of the following is the most likely diagnosis?

1. Behcet syndrome ✔
2. Herpes simplex infection
3. Neisseria gonorrhoeae infection
4. Psoriasis
5. Treponema pallidum infection

INCORRECT ✖

The correct answer is 1.
This is Behcet syndrome. The laboratory findings are usually nonspecific indications of an inflammatory process (such as those illustrated in the question stem), so the diagnosis is usually established by the history (and may take months to years since not all features are typically present from the beginning). Characteristic features include painful oral ulcers, painful genital ulcers (in men, in women they may be painless), ocular disease (most often a relapsing iridocyclitis that causes pain and photophobia), skin lesions (papules, pustules, vesicles, or folliculitis), and mild arthritis of large joints. Other features that may be seen include CNS involvement and migratory thrombophlebitis.
(Choice 2) can cause oral and genital ulcers, but the Tzanck smear would probably be positive and arthritis would be unlikely.
(Choice 3) can affect both genitalia and joints, but does not usually cause ulcers.
(Choice 4) can cause both skin lesions and arthritis, but the skin lesions are characteristically scale covered plaques.
(Choice 5) can cause ulcers (the chancre) but does not usually cause arthritis.

20. Question **1 points**

A 65 year old man reports feeling increasingly tired and short of breath. He had been well until a year ago, when he started losing weight despite any dietary change. He also complains of pencil thin stools. His wife has commented that he seems very pale. He is on no medications. Physical examination shows a pale appearing man with an elevated heart rate. Rectal examination is positive for occult blood. Laboratory studies are remarkable for a hematocrit of 25%. Which of the following is the most appropriate next step in diagnosis?

1. KUB (x-ray film showing the kidney, ureters and bladder)
2. Colonoscopy ✔
3. Esophagoduodenoscopy
4. Sigmoidoscopy
5. Open laparotomy

INCORRECT ✖
The correct answer is 2.
This patient may have colon cancer. The weight loss, pallor, and anemia are indicative of a chronic bleed, supported by the stool positivity for occult blood. Risk factors for colon cancer include a positive history of colon cancer or adenomatous polyps in a first-degree relative

and a personal history of adenomatous polyps. Since our suspicion of colorectal cancer is high, it would be helpful to detect the lesion and remove it if possible. Colonoscopy provides the most efficient modality with which to achieve this goal.
(Choice 1) A KUB is usually a good modality for evaluating obstruction, which is a potential complication of colon cancer. This patient is not complaining of obstruction, and a KUB would not detect a soft tissue mass.
(Choice 3) would be done to evaluate the patient for a source of upper gastrointestinal bleeding, such as ulcers, varices, or gastric cancer.
(Choice 4) would be an effective screening test, but only 25 to 30% of colorectal cancers are detected by rigid sigmoidoscopy; the rate increases to 40 to 65% when flexible sigmoidoscopy is used. This patient has a high pre-test probability of having colorectal cancer, and since visualization of the entire colon will guide further action, sigmoidoscopy would be inadequate.
(Choice 5) might ultimately be needed if the patient undergoes colonic resection; however, it would be premature to immediately proceed to this option.

21. Question

1 points

A 42 years old woman with a history of rheumatoid arthritis develops tingling, pain, and focal numbness of one hand. These sensations involve the palmar aspect of the thumb and fingers, with the exception of the ulnar edge of the little finger. The woman works as a secretary and has noticed that her symptoms are worst at night; particularly after she has done considerable typing during the preceding workday. Tapping on the volar surface of the wrist with a reflex hammer reproduces the symptoms. Which of the following is the most likely diagnosis?

1. Carpal tunnel syndrome ✔
2. Cubital tunnel syndrome
3. Radial tunnel syndrome
4. Reflex sympathetic dystrophy
5. Scapholunate ligament rupture

INCORRECT ✖

The correct answer is 1.

The patient probably has carpal tunnel syndrome, which is caused by compression of the median nerve as it passes through the carpal tunnel in the wrist. The symptoms illustrated in the question stem are typical, as is the history of exacerbation of symptoms at night following heavy wrist use during the day. The test described is the Tinel test, which can be used to

assess other superficial nerves as well. Milder cases of carpal tunnel syndrome may respond to rest and nonsteroidal anti-inflammatory drugs; more severe cases may require surgical decompression.
(Choice 2) compresses the ulnar nerve at the elbow, producing numbness and paresthesias of the ring and little fingers.
(Choice 3) involves compression of branches of the radial nerve in the arm or forearm. It causes pain of the back of the forearm and hand, sometimes with wrist drop.
(Choice 4) is pain and limited motion of the shoulder accompanied by ipsilateral involvement of the hand.
(Choice 5) usually occurs during a fall onto an outstretched hand and causes pain in the mid-wrist.

22. Question

1 points

An 18 year old student comes to the physician 5 hours after sustaining an injury to his right ankle while playing football. He says that he "rolled his ankle over: 'but denies feeling any snap or crack at the time of injury. He walks with a slight limp. Examination shows swelling of the right ankle, especially on the lateral side. Pulses and sensation are normal. Pain is most pronounced in the area of the calcaneofibular ligament. The "drawer "test is normal, but the "talar tilt" test reveals increased excursion on the right compared with the uninjured side. There is no tenderness on palpation of the lateral malleolus. Which of the following is the most appropriate next step in management?

1. Referral to orthopedic specialist
2. Treatment with nonsteroidal anti-inflammatory drugs without ankle immobilization
3. Treatment for acute ankle sprain with rehabilitation within 72 hours ✔
4. Treatment for acute ankle sprain with rehabilitation after 10 days of ankle rest
5. X-ray examination

INCORRECT ✖

The correct answer is 3.

This patient presents with a lateral ankle sprain. Clinical assessment is usually sufficient to diagnose this condition, unless there are signs suggesting the presence of fracture. The drawer and talar tilt tests are used to assess ligament instability and confirm a diagnosis. A positive talar tilt test indicates injury to the calcaneofibular ligament, and a positive drawer test indicates injury to the anterior talofibular ligament. The history is also very important in clarifying the mode of traumatic injury. Currently recommended treatment for uncomplicated ankle sprains of mild-to-moderate degree includes protection of the injured joint by splinting

or immobilizing boot; rest of the injured joint; ice application several times daily; compression by elastic wrap, and elevation of the limb to reduce edema (which gives the PRICE mnemonic). Adjuvant anti-inflammatory or analgesic treatment may be used. Patients with lateral ankle sprains should start rehabilitation early, usually after 24-72 hours of ankle rest. Treatment for acute ankle sprain with rehabilitation after 10 days of ankle rest **(Choice 4)** has been found to be unnecessary compared with shorter periods of immobilization.
(Choice 1) is rarely necessary, unless there are complicating factors, such as associated injuries to other joints or fractures.
(Choice 2) Treatment with nonsteroidal anti-inflammatory drugs without ankle immobilization is definitely inappropriate in any case of ankle sprain, however mild.
(Choice 5) is indicated when there are signs suggestive of fractures, such as history of a snapping or popping sound at the time of injury, pain in the malleolar region, and tenderness on pressure on the lateral malleolus. It is recommended that patients older than 55 years should undergo routine x-ray control even in the absence of clinical signs of fractures because of the increased incidence of occult fractures in more advanced age.

23. Question

1 points

One week following an uncomplicated delivery, a 27- year-old woman comes to the physician because of polyuria and excessive thirst. Her pregnancy was normal, but she reports that she began to feel an unusual craving for ice water in the last month of gestation. She is forced to get up at night several times to void and drinks large amounts of water. Her blood pressure is 120/80 mm Hg. Serum electrolytes are within normal limits. A 24-hour urine collection during ad libitum water intake yields the following results:

Total volume: 10 L
Specific gravity: <1.006
Glucose: Absent
Protein: <150 mg

Which of the following is the most appropriate next step in management?

1. Advise the patient to reduce water intake
2. Perform vasopressin challenge test ✔
3. Order MRI studies of the pituitary-hypothalamic region
4. Refer for psychiatric evaluation of compulsive water drinking
5. Refer to nephrologist for evaluation of nephrogenic diabetes insipidus

INCORRECT ✖

The correct answer is 2.
The clinical picture is highly suggestive of diabetes insipidus, a disorder due to deficiency of antidiuretic hormone (ADH) secretion from the posterior pituitary gland. Polydipsia is a consequence of polyuria (not an effect) because of abundant diuresis secondary to ADH deficiency. The vasopressin challenge test is given by administering desmopressin (a synthetic form) by the nasal route, and monitoring the urine output 12 hours before and 12 hours after administration. If the symptomatology is due to central diabetes insipidus, the patient will experience an immediate reduction in thirst and urine output. Diabetes insipidus may manifest in the third trimester of pregnancy or during the puerperium because of a circulating enzyme
(vasopressinase) that degrades vasopressin. The enzyme is not effective against desmopressin. The disorder resolves spontaneously.
(Choice 1) Besides the high likelihood of noncompliance, advising the patient to reduce water intake would expose her to severe dehydration and hypernatremia due to loss of water and resultant hemoconcentration.
(Choice 3) MRI studies of the pituitary-hypothalamic region are performed to search for mass lesions that may be the underlying cause of central diabetes insipidus. These investigations should be performed after the diagnosis has received confirmation by a vasopressin challenge test.
(Choice 4) Compulsive water drinking may require psychiatric evaluation, and may mimic diabetes insipidus, but this possibility should be undertaken once diabetes insipidus has been ruled out. In this particular case, the close temporal association with pregnancy and delivery makes the diagnosis of diabetes insipidus more likely.
(Choice 5) Evaluation of nephrogenic diabetes insipid us is the next appropriate step if the patient does not respond to vasopressin challenge test. Nephrogenic diabetes insipidus, in fact, is due to resistance of renal tubules to the action of vasopressin. A hereditary X-linked form is known, usually associated with hyperuricemia. Acquired forms are associated with a variety of conditions, e.g., pyelonephritis, multiple myeloma, and chronic hypercalcemia.

24. Question **1 points**

A 74 year old man is hospitalized for treatment of enterococcal pneumonia. He has a history of gout and hyperuricemia, for which he takes allopurinol. In the hospital, the patient receives treatment with ampicillin and gentamicin for 7 days. Despite antibiotic therapy, he remains persistently febrile. On the 8th hospital day, he manifests signs of rapidly progressive renal insufficiency. His temperature is 38.2C (100.8 °F),blood pressure is 100/60mm Hg, pulse is 100/min, and respirations are 20/min. Laboratory investigations show:

Blood serum:

Sodium: 145 mEq/L
Potassium: 6.5 mEq/L
Chloride: 110 mEq/L
Bicarbonate: 20 mEq/L

Urea nitrogen: 40 mg/dL
Creatinine: 3.5 mg/dL
Uric acid: 8.5 mg/dL

Urine:

Sodium: 23 mEq/L
Creatinine: 35 mg/dL
Pigmented granular casts: Present
Protein: Negative
Erythrocytes: Negative

Which of the following is the most likely cause of this patient's renal failure?

1. Allopurinol toxicity
2. Ampicillin toxicity
3. Gentamicin toxicity ✔
4. Hyperuricemia
5. Hypotension
6. Sepsis

INCORRECT ✖

The correct answer is 3.

Acute renal failure (ARF) is a common occurrence in hospitalized patients. It is crucial to determine whether ARF is secondary to prerenal or renal causes. In the former case, the underlying cause is reduction of blood flow to normal kidneys, resulting in a decreased glomerular filtration rate. In the latter, intrinsic renal damage is the underlying etiology. Of the intrinsic causes of ARF, acute tubular necrosis is the most common. How can one distinguish between prerenal and renal forms of ARF? Sodium reabsorption is not impaired in prerenal azotemia, whereas creatinine reabsorption is deficient in both prerenal and intrinsic renal azotemia. Fractional excretion of sodium (FE_{Na}) is therefore a most useful parameter to distinguish between these two conditions. It can be calculated by the following formula: Na_{URINE} x Cr_{PLASMA}/Cr_{URINE} x Na_{PLASMA}, x 100.

In prerenal azotemia, FE_{Na} < 1 % because the undamaged renal tubules will avidly absorb sodium. In acute tubular necrosis, as well as other intrinsic renal causes of azotemia, damaged tubules will allow sodium to leak into urine, and FE_{Na} will be > 1 %. In this particular case, the calculation yields FE_{Na}= 1.6%. Gentamicin is the most nephrotoxic of the aminoglycoside antibiotics. Its toxicity usually manifests after 5-7 days of treatment.

(Choice 1) The most frequent manifestation of allopurinol toxicity is a pruritic rash due to hypersensitivity. Vasculitis and hepatitis are other, albeit rare, adverse effects.

(Choice 2) Ampicillin toxicity may manifest with renal damage, but usually in the form of acute interstitial nephritis, not acute tubular necrosis. Acute interstitial nephritis is associated with fever, rash, blood eosinophilia, and leukocyturia with eosinophils.
(Choice 4) Hyperuricemia may cause acute tubular necrosis, but only when serum uric acid levels rise rapidly as a result of rapid cell turnover. This may develop with hematologic malignancies or germ cell neoplasms treated with chemotherapy. Uric acid levels are often very high (>20 mg/dL).
(Choice 5) Hypotension is the underlying pathogenetic factor of most conditions leading to prerenal azotemia, such as hypovolemic, cardiogenic, or anaphylactic shock. Renal tubular function is preserved, but the fall in glomerular filtration rate results in oliguria/anuria and ARF. FEN a is very low (< 1 %). Clinical history is obviously an important aid in the differential diagnosis between prerenal and renal azotemia.
(Choice 6) is a frequent cause of prerenal azotemia when associated with shock. In this case, the laboratory data rule out this possibility.

25. Question

1 points

A 72 year old woman is driven to the emergency department because 10 minutes earlier she had developed painless, sudden, unilateral blindness. When light is shined on the affected eye, the pupil fails to constrict. When the light is shined on the opposite eye, the affected eye's pupil constricts briskly. Tonometry of both eyes is within normal limits. Ophthalmoscopy demonstrates a pale, opaque fundus with a red fovea. The arteries are markedly attenuated. Which of the following is the most likely diagnosis?

1. Age-related macular degeneration
2. Central retinal artery occlusion ✔
3. Central retinal vein occlusion
4. Hypertensive retinopathy
5. Retinitis pigmentosa

INCORRECT ✖

The correct answer is 2.

The presentation is classic for central retinal artery occlusion, which is a blockage of the central retinal artery by embolism or thrombosis that causes painless, sudden, unilateral blindness. Patients may have underlying atherosclerosis, endocarditis, or temporal arteritis. The retinal changes illustrated in the question stem are typical and are the result of a failure of blood to flow into the retina. Immediate treatment is imperative. Intermittent digital massage

over the closed eyelids may dislodge the embolus and allow it to flow into a smaller blood vessel, where it will cause a small area of retinal ischemia. If this fails, anterior chamber paracentesis will also sometimes dislodge the embolus.
(Choice 1) can also present with sudden, painless, unilateral blindness, but the fundus will show pigmentary changes with or without new vessel formation behind the retina.
(Choice 3) can also cause painless, unilateral blindness. However, it tends to develop a little more slowly than central artery occlusion, and the retinal vessels appear congested.
(Choice 4) does not usually cause sudden blindness.
(Choice 5) develops over a period of years, with loss of peripheral vision.

26. Question

1 points

A 45 year old woman presents to a physician with marked swelling of her hands. Five years previously, she had developed multiple arthralgias, and early rheumatoid arthritis was suspected; however, no confirmatory immunologic studies had been performed at that time. Since then, she has experienced difficulty swallowing and mild dyspnea on exertion. On physical examination, the hands are strikingly swollen, producing a sausage-like appearance to the fingers. Other findings include erythematous patches over the knuckles, a mild malar rash, and slight violaceous discoloration to the eyelids. No joint deformity is noted, although many joints are tender. A chest x-ray film demonstrates diffuse interstitial infiltrates. In antibody studies, high titers of antibodies directed against which of the following antigens will most likely be present?

1. c-ANCA
2. dsDNA
3. p-ANCA
4. Scl-70
5. RNP ✔

INCORRECT ✖

The correct answer is 5.

This patient has mixed connective tissue disease. Clinically, it appears to be an overlap syndrome with features similar to rheumatoid arthritis, systemic lupus erythematosus, scleroderma, Sjogren syndrome, and polymyositis or dermatomyositis. It is now considered a separate disease because of a distinct autoantibody pattern, with very high levels of antibody directed against ribonucleoprotein. Rheumatoid agglutinins may also be present in high titers. Other antibodies characteristic of the individual diseases that mixed connective tissue disease mimics are usually absent or present only in low titers. The clinical presentation may be wildly diverse, depending on which disease pattern manifests first. With

time, however, there should be clinical features suggestive of a variety of different autoimmune diseases. Mild disease may be controlled with measures similar to mild rheumatoid arthritis (salicylates, other NSAIDs, antimalarials, very-low-dose corticosteroids); more severe disease (which may be fatal with complications due to vascular lesions, renal failure, myocardial infarction, disseminated infection, or cerebral hemorrhage) usually requires large-dose steroids.
(Choice 1) Associate c-ANCA with Wegener granulomatosis.
(Choice 2) Associate dsDNA with systemic lupus erythematosus.
(Choice 3) Associate p-ANCA with microscopic polyarteritis.
(Choice 4) Associate Scl-70 with systemic sclerosis.

27. Question

1 points

A 21 year old woman presents to the emergency department with several days of fever and fatigue. Her temperature is 39.0C (102.2 F), her pulse is 90/min, and her blood pressure is 96/64 mm Hg. Her chest is clear to auscultation, and her abdomen is soft and nontender. A grade III/IV holosystolic murmur that increases on inspiration is best heard along the left sternal border. A CBC shows normochromic normocytic anemia. Chest x-ray films reveal several well-circumscribed, round infiltrates in multiple lobes. Echocardiography and blood cultures suggest a diagnosis of acute bacterial endocarditis limited to the tricuspid valve. Which of the following is the most likely explanation for these findings?

1. Congenital heart disease
2. Illicit drug use ✔
3. Rheumatic fever
4. Rheumatoid arthritis
5. Systemic lupus erythematosus

INCORRECT ✖
The correct answer is 2.
The most probable etiology of bacterial endocarditis involving the tricuspid valve is illicit IV drug use, which can introduce skin organisms into the venous system that then proceed to attack the tricuspid valve. Staphylococcus aureus accounts for between 60 and 90% of cases of endocarditis in IV drug users.
(Choice 1) The endocarditis associated with congenital heart disease typically involves either damaged valves or atrial or ventricular septal defects. The tricuspid valve is not particularly vulnerable.

(Choice 3) Rheumatic fever most commonly damages the mitral and aortic valves, and tricuspid damage is usually less severe and seen only when the mitral and aortic valves are heavily involved. Consequently, secondary bacterial endocarditis involving only the tricuspid valve in a patient with a history of rheumatic fever would be unusual.
(Choice 4) Rheumatoid arthritis is not associated with bacterial endocarditis.
(Choice 5) Systemic lupus erythematosus can produce small, aseptic vegetations on valves (Libman-Sacks endocarditis) but is not associated with bacterial endocarditis.

28. Question

1 points

A 22 year old man is brought to the emergency department several hours after sustaining a severe head trauma during a soccer game. He became unconscious for a short time soon after the accident, regained consciousness for 3 hours, and subsequently relapsed into coma. On arrival, the patient appears unresponsive to verbal or painful stimuli. A scalp lesion consistent with prior contusion is found in the right parietal region. The right pupil is dilated and poorly reactive to light, and funduscopic examination reveals early papilledema. X-ray films of the head show a linear fracture in the right calvarial wall. Which of the following is the most likely diagnosis?

1. Epidural hemorrhage ✔
2. Fracture without associated brain injury
3. Intracerebral hypertensive hemorrhage
4. Subarachnoid hemorrhage
5. Subdural hemorrhage

INCORRECT ✖

The correct answer is 1.

The clinical presentation is highly characteristic of epidural bleeding, which usually is of traumatic origin and most often results from rupture of the middle meningeal artery. The initial concussion leads to a brief loss of consciousness, which is followed by a lucid interval lasting several hours. As the epidural hematoma progressively enlarges and pushes the underlying brain, the patient becomes comatose again and may display signs of uncal herniation. The herniating uncus pushes on the third cranial nerve, producing ipsilateral fixed pupillary dilatation. Papilledema is usually a late sign and indicates cerebral edema.
(Choice 2) A calvarial fracture would not cause such a severe neurologic state and evidence of uncal herniation unless associated with an intracranial hematoma.
(Choice 3) Intracerebral hypertensive hemorrhage usually occurs spontaneously and develops within the brain parenchyma (most commonly in the basal ganglia). Loss of consciousness develops in approximately 50% of patients. Headache, vomiting, and variable

neurologic deficits are present.
(Choice 4) Subarachnoid hemorrhage characteristically manifests with sudden onset (thunderclap) of headache associated with vomiting and progressive impairment of consciousness. The most frequent cause is rupture of berry aneurysms.
(Choice 5) The clinical manifestations of a subdural hemorrhage may vary depending on the severity and location. Cerebral atrophy is a predisposing condition, as it leads to "stretching" of bridging veins that connect the veins on the cerebral convexities with the superior sagittal sinus. Minimal trauma may then result in tearing of such veins. Impaired consciousness and/or focal neurologic deficits follow the traumatic event after an interval of days or weeks.

29. Question

1 points

A 56-year-old male presents with progressively worsening dyspnea over a 4 month period. He denies fever, chest pain, cough or ankle swelling and does not use tobacco, alcohol or drugs. He works for a home insulation and plumbing company. He has never been abroad and does not own any pets. His only medications are hydrochlorothiazide and metoprolol for blood pressure control. On physical examination, his temperature is 36.8°C (98.2°F), pulse is 76/min, blood pressure is 130/78 mmHg, and respirations are 15/min. Examination shows digital clubbing and fine bibasilar end-inspiratory crackles. Jugular venous pressure is 7 cm and there is no peripheral edema. Which of the following additional findings is most likely in this patient?

1. Increased pulmonary capillary wedge pressure
2. Decreased diffusion lung capacity (DLCO) ✔
3. Decreased pulmonary arterial pressure
4. Increased residual lung volume
5. Reduced FEV1/FVC ratio

INCORRECT ✖

The correct answer is 2.

Individuals with an occupational history involving mining, shipbuilding, insulation, or pipe work are at risk for asbestosis, a type of pneumoconiosis. Typically, there is a latency period of >20 years between the initial exposure to asbestos and disease presentation. Progressive dyspnea without cough over months, plus chest pain and fever, is typical for asbestosis. Digital clubbing and bibasilar end-inspiratory crackles are common findings on physical examination, each seen in approximately 50% of affected patients. Typical chest x-ray findings include interstitial abnormalities of the lower lung fields and pleural plaques. As in

other forms of interstitial lung disease, pulmonary function tests reveal a restrictive pattern (decreased lung volumes with normal or elevated FEV1/FVC) accompanied by reductions in diffusion lung capacity (DLCO) and pulmonary compliance.
(Choice 1) Pulmonary capillary wedge pressure (PCWP) is an indicator of the left atrial pressure. An elevated PCWP in the setting of dyspnea confirms a cardiac origin for the patient's symptoms. However, this particular patient's normal jugular venous pressure, lack of edema and absence of chest pain make a cardiac cause unlikely.
(Choice 3) Interstitial lung disease is one of many potential causes of pulmonary hypertension. In asbestosis, scarred lung parenchyma may impede blood flow within the lungs, thereby causing elevated pulmonary arterial pressure.
(Choice 4) Residual lung volume is the amount of air remaining in the lung after maximal exhalation. It is increased in obstructive lung diseases like asthma, COPD, and bronchiectasis. In restrictive lung diseases like asbestosis, the residual lung volume is normal or decreased.
(Choice 5) The FEV1/FVC ratio is reduced to 80%.

30. Question

1 points

A 43-year-old moderately overweight woman presents to the emergency department complaining of two days of shortness of breath. Today, while climbing stairs, she had an episode of severe lightheadedness and near syncope. Her medical history is significant for a right calf deep venous thrombosis one year ago. She takes no medications currently. On physical examination, her blood pressure is 90/50 mmHg and her heart rate is 120/min and regular. Imaging studies are most likely to reveal which of the following?

1. Mitral stenosis
2. Pericardial effusion
3. Right ventricular dilation ✔
4. Bilateral pulmonary nodules
5. Asymmetric hypertrophy of the intraventricular septum

INCORRECT ✖

The correct answer is 3.

This woman presents with hypotension, tachycardia, shortness of breath, and a history of deep vein thrombosis (DVT), findings concerning for a pulmonary embolus (PE). Right ventricular dilatation and failure (secondary to obstructed outflow) is a severe potential

complication of PE that may be obvious on echocardiogram. Hemodynamic instability is an indication, and right ventricular strain a relative indication, for thrombolytics in patients with PE.
(Choice 1) Mitral stenosis typically results from rheumatic heart disease and classically presents in women during pregnancy.
(Choice 2) Cardiac tamponade presents with acute hypotension, tachycardia, shortness of breath, and near syncope. However, this woman's history of DVT makes massive PE the more likely diagnosis.
(Choice 4) Bilateral pulmonary nodules may have infectious, rheumatologic, or malignant causes. There is no clear suggestion of infection here, and nodules alone would be unlikely to cause these symptoms.
(Choice 5) Asymmetric hypertrophy of the intraventricular septum is the hallmark finding in hypertrophic obstructive cardiomyopathy (HOCM). Patients may present with subacute or chronic dyspnea on exertion or sudden death. This patient's history of DVT and lack of previous symptoms make HOCM less likely than PE.

31. Question

1 points

A healthy 33-year-old man comes for a pre-employment examination. He has no complaints and has no medical problems. He does not use tobacco, alcohol, or drugs and takes no medications. He has no occupational exposures and has lived his entire life in suburban Mississippi. His temperature is 36.7 C (98.0 F), blood pressure is 120/80 mm Hg, pulse is 78/min, and respirations are 16/min. Examination shows no abnormalities. His chest x-ray shows a 1 .5 cm nodule in his right mid-lung field. Other labs are unremarkable. Which of the following is the most likely diagnosis?

1. Coccidioidomycosis
2. Histoplasmosis ✔
3. Tuberculosis
4. HIV infection
5. Pneumocystis jiroveci infection

INCORRECT ✖

The correct answer is 2.

This is a patient with an asymptomatic pulmonary nodule. All the given options (except a few) can be considered in the differential diagnosis of a pulmonary nodule; however, the fact that

the patient does not have any complaints or any significant past history, and he was residing in suburban Mississippi for his whole life, puts him at risk of histoplasmosis, which is most likely responsible for the asymptomatic pulmonary nodule in this patient.
Histoplasma capsulatum is a dimorphic fungus and a common and usually asymptomatic infection. It is usually found in soil with a high concentration of bird or bat guano droppings. The infection is contracted by inhalation of the spores or mycelial fragments. Infection is very common in endemic areas and most people are infected before adulthood.
Less than 5% of infected people develop the symptomatic disease. The extent of disease is determined by the amount of exposure and immunity of the host. Symptomatic lung infection is mostly characterized by self limiting fever, chills, and a non-productive cough. A chest x-ray may show patchy lobar or multinodular lobar infiltrates. Chronic cavitary pulmonary histoplasmosis is a progressive, fatal form of histoplasmosis that usually develops in older chronic obstructive pulmonary disease patients. Disseminated histoplasmosis is seen in immunocompromised adults and young children.
Cancer is unlikely, since he is a non-smoker and his age is less than 35 years.

32. Question

1 points

A 63-year-old male complains of cough and nocturnal wheezing. The cough is mostly non-productive but can sometimes relieve chest tightness if a small amount of yellow sputum is produced. His past medical history is significant for a hospitalization for a 'chest infection' two years ago. His appetite is good but he lost 5 pounds over the last several months. He has smoked one pack of cigarettes per day for the past 40 years. He drinks 2-3 cans of beer per day on the weekends. His mother suffered from diabetes mellitus and his father died of a stroke. On physical examination, his blood pressure is 140/80 mm Hg and his heart rate is 80/min. There is chest hyperinflation and scattered expiratory wheezes on auscultation. The patient expires through pursed lips. His fingers demonstrate prominent clubbing. This patient's clubbing is most likely related to:

1. Lung hyperinflation
2. Airflow obstruction
3. Pulmonary hypertension
4. Hypoxemia
5. Occult malignancy ✔

INCORRECT ✖

The correct answer is 5.
This patient has a classic presentation for chronic obstructive pulmonary disease (COPD), including a 40- pack year smoking history, productive cough, and shortness of breath. Clinical examination shows features of emphysema. However, finger clubbing is not a feature of simple COPD **(Choices 1 & 2)**, and in fact the appearance of fingernail clubbing in COPD patients strongly suggests lung malignancy. Finger clubbing is thickening of the nail bed that causes a decrease in the angle between the nail bed and the nail fold. In severe clubbing the terminal parts of the fingers and toes appear swollen like drumsticks.
(Choices 3 & 4) Pulmonary hypertension and hypoxemia due to congenital heart disease often result in clubbing. However, the pulmonary hypertension and hypoxemia of COPD are rarely associated with digital clubbing.

33. Question

1 points

A 65-year-old male with oxygen-dependent chronic obstructive pulmonary disease, chronic atrial fibrillation, and depression comes into the Emergency Room, with symptoms of increased dyspnea and worsening cough pattern. His recent history had been significant for a gradual worsening of his baseline lung disease over the past month, which had been treated by his outpatient doctor with increased frequency of inhaled β-agonist and azithromycin. This morning he had a severe shortness of breath that was unresponsive to "stacked" home nebulizer treatments. The ER physician notes that the patient is in moderate severe respiratory distress. His temperature is 37.2 C (99 F), blood pressure is 150/90 mmHg, pulse is 110/min, and respirations are 28/min. Accessory muscle use was noted. Lung exam shows diffuse rhonchi and wheezing. A pulse oximetry revealed an oxygen saturation of 80% on room air. His chest x-ray showed no new infiltrates. His WBC count is 7,000/cm^2 with normal differential. The ER physician had given nebulization, and the patient is on 5-liters of oxygen. Which of the following should also be considered in this patient?

1. Gatifloxacin
2. Methylprednisolone
3. N-acetylcysteine
4. Clarithromycin ✔
5. Aminophylline

INCORRECT ✖
The correct answer is 4.
This patient has a history of chronic obstructive pulmonary disease (COPD). His current symptoms are manifestation of an acute exacerbation of his underlying disease. The acute

episodes are typically managed with ipratropium and albuterol nebulization and systemic steroids. The most commonly used parenteral steroid is methylprednisolone.
(Choices 1 & 4) There is some role of antibiotics, like gatifloxacin and clarithromycin, in the management of an acute episode of dyspnea in a patient with severe oxygen dependent COPD; however, this patient has already been treated with antibiotics, has no fever, WBC count is normal, and there is no infiltrate on chest x-ray. So, due to the previous facts, having pneumonia or a bacterial infection is unlikely.
(Choice 3) N-acetylcysteine is a mucolytic agent, which is no longer used in exacerbation of COPD, as they are even implicated in worsening bronchospasm.
(Choice 5) Aminophylline is proven to be inferior to a combination of bronchodilator and corticosteroids for the treatment of acute exacerbation of COPD.

34. Question

1 points

An 80-year-old female is brought to the emergency room by her son with a three-day history of fever and a foul-smelling, productive cough. Her past medical history is significant for advanced dementia, diabetes, and hypertension. She takes aspirin, metformin, insulin, and atenolol. She was admitted two times with pneumonia during the past two months. Her temperature is 38.3 C (101 F), blood pressure is 100/70mmHg, pulse is 105/min, and respirations are 20/min. The patient is not oriented in time and place. Physical examination reveals dry mucus membranes and decreased skin turgor. Breath sounds are decreased to the right. A chest x-ray revealed right, lower lobe infiltrate. Which of the following is the most important predisposing factor for this condition in this patient?

1. Decreased lung elasticity
2. Gastro-esophageal reflux
3. Impaired epiglottic reflex ✔
4. Decreased thyroid function
5. Depressed cell-mediated immunity
6. Depressed humeral immunity

INCORRECT ✖

The correct answer is 3.

This patient presents with community-acquired pneumonia, most likely from aspiration. Impaired swallowing and epiglottic reflex are frequent abnormalities in patients with advanced dementia. As a result, these patients are predisposed to aspiration of oropharyngeal

secretions. Anaerobic bacteria in combination with some aerobic oral flora (e.g., viridans streptococci) are the usual etiologic factors of aspiration pneumonia. The infection may be necrotic and quickly progress to an abscess.
(Choices 1, 5 & 6) Advanced age, per se, is a predisposing factor to pneumonia. Several factors may be involved, including senile lung changes, pulmonary co-morbidities, and decline in the immune defense mechanisms.
(Choice 2) Advanced gastro-esophageal reflux can cause aspiration of gastric content, bronchoconstriction, and pneumonia. It is less likely than impaired epiglottic reflex as the cause of pneumonia in this patient.

35. Question **1 points**

A 40-year-old man comes to the emergency department because of fever, dry cough, and shortness of breath. Symptoms started 24 hours ago. He denies hemoptysis. He was recently discharged from the hospital after a second cycle of chemotherapy for acute myeloid leukemia. He does not use tobacco, alcohol, or drugs. His temperature is 38.9 C (102.0 F), blood pressure is 120/70 mm Hg, pulse is 112/min and respirations are 28/min. The patient's pulse oximetry showed 86% at room air. Examination shows diffuse crackles all over the lung fields. His chest x-ray shows diffuse interstitial infiltrates. Which of the following is the most likely cause of his condition?

1. Coccidioidomycosis
2. Histoplasmosis
3. Aspergillosis
4. HIV infection
5. Pneumocystis jiroveci ✔

INCORRECT ✖
The correct answer is 5.
The patient in this vignette is immunocompromised due to his chemotherapy, which put him at high risk for numerous opportunistic infections. The clinical presentation suggests atypical pneumonia, which along with characteristic chest x-ray findings is suggestive of Pneumocystis jiroveci (P. jiroveci) pneumonia.
Pneumocystis jiroveci is an opportunistic pathogen, and an important cause of pneumonia in immunocompromised hosts. Its natural habitat is the lung, and the incubation period ranges from 4-8 weeks. It is airborne transmitted. P. jiroveci pneumonia is characterized by dyspnea, fever, and a nonproductive cough. Physical examination would show tachypnea, tachycardia, and cyanosis with minimal chest findings. Bilateral diffuse interstitial infiltrates

beginning in the perihilar region is a characteristic finding on chest x-ray in P. jiroveci pneumonia. P. jiroveci may disseminate outside the lung, and the most common sites of extrapulmonary involvement are the lymph nodes, spleen, liver, and bone marrow.
(Choice 4) Candida is an extremely rare organism to cause pneumonia in any patient. It is often colonized in bronchial epithelium and sometimes the sputum and culture may be positive; however, it is not the cause of pneumonia. Always look for something else. Think about candida if the question is talking about esophagitis, endocarditis, endophthalmitis, hepatoplenic disease, and meningitis.
(Choice 3) Aspergillosis can also be seen in immunocompromised patients; however, the chest x-ray typically shows a solid mass surrounded by a radiolucent crescent (crescent sign, Monad's sign).

36. Question

1 points

A 65-year-old female presents with 6 months of worsening dyspnea and dry cough. Whereas she had previously enjoyed an active lifestyle, she now becomes breathless after walking just a few steps. The patient denies fever or chest pain and does not use tobacco, alcohol or illicit drugs. Her only medicine is hydrochlorothiazide for hypertension. She is retired and lives with her husband. She has never traveled abroad and denies any history of exposure to pets. On physical examination, her temperature is 37.2°C (98.9°F), blood pressure is 140/86 mm Hg, pulse is 84/min and respirations are 18/min. Examination shows dry, late inspiratory crackles and finger clubbing. Her chest x-ray is shown below:

1. Increased diffusing capacity of carbon monoxide
2. Decreased FEV1/FVC ratio
3. Increased residual volume
4. Increased PaCO₂
5. Increased A-a gradient ✔

INCORRECT ✖

The correct answer is 5.

Idiopathic pulmonary fibrosis (IPF) is a restrictive lung disease of unknown etiology. In IPF, chronic inflammation of the alveolar walls causes progressive widespread fibrosis and destruction of the normal lung architecture. Patients present with chronic progressive dyspnea, nonproductive cough and digital clubbing. Fever and chest pain are typically absent Examination demonstrates dry, end-inspiratory crackles.

Pulmonary function tests (PFTs) in patients with this condition show a restrictive pattern (decreased TLC, FEV1 and FVC; normal FEV1/FVC). The diffusing capacity is progressively reduced, largely due to ventilation perfusion mismatch, resulting in an increased A-a gradient. Chest x-rays in IPF typically demonstrate decreased lung volumes, airway fibrosis giving a "honeycomb" pattern, and pulmonary vascular congestion most evident in the hilum.
(Choices 2 & 3) In restrictive lung diseases, total lung capacity (TLC), functional residual capacity, and residual volume are all reduced. Flow volumes are also reduced but the ratio of FEV1 /FVC is either normal or increased as alveolar fibrosis increases elastic recoil.
(Choice 4) Restrictive lung diseases are more likely to cause hypoxemia than hypercarbia. The $PaCO_2$ in IPF is usually low until end-stage disease occurs.

37. Question

1 points

A 65-year-old man with chronic obstructive pulmonary disease, chronic atrial fibrillation, hypertension, and diabetes mellitus presents with a three day history of shortness of breath. His condition began with runny nose, itchy eyes, and sore throat, but his symptoms progressed to productive cough, wheeze, and dyspnea. Physical examination reveals a mildly overweight man in moderate respiratory distress. His blood pressure is 150/90 mm Hg and his heart rate is 110/min and irregular. On chest auscultation, expirations are prolonged and there are bilateral wheezes. You administer bronchodilators, facial mask oxygen, and Lorazepam for agitation. Thirty minutes later, he is lethargic and confused. While you discuss the case with your attending, the patient experiences a generalized tonic-clonic seizure. Which of the following most likely underlies his neurologic symptoms?

1. New-onset thromboembolic stroke
2. Cerebral vasoconstriction
3. Subarachnoid hemorrhage
4. Carbon dioxide retention ✔
5. Metabolic acidosis

INCORRECT ✖

The correct answer is 4.

This is a patient with carbon dioxide narcosis secondary to a severe COPD exacerbation. A viral upper respiratory infection is often the inciting event for a COPD exacerbation; if the infection and/or underlying lung disease is severe, frank respiratory failure may ensue. In severe exacerbations, alveolar hypoventilation leads to hypoxia and hypercapnia. Sedatives

should be avoided in these patients as they can exacerbate alveolar hypoventilation. Elevated carbon dioxide concentrations can cause confusion, somnolence, coma, and tonic-clonic seizures.
(Choice 1) A thromboembolic stroke is more likely to cause unilateral hemiparesis, numbness, or paresthesias than somnolence or tonic-clonic seizures, particularly in the setting of a COPD exacerbation.
(Choice 2) Diffuse cerebral vasoconstriction may result from drugs (e.g. cocaine) or intracranial hypertension, among other causes. Here, we have no reason to suspect toxic ingestion and the patient's blood pressure does not support hypertensive encephalopathy.
(Choice 3) Subarachnoid hemorrhage commonly results from shear injury. Patients may experience progressive confusion, lethargy, and seizures. However, this patient has no history of trauma.
(Choice 5) Respiratory failure can cause lactic acidosis due to progressive tissue hypoxia.

38. Question

1 points

A 32-year-old man presents to the emergency department with pain and swelling in the right leg. He was recently hospitalized for a right lower extremity deep venous thrombosis and discharged on warfarin. Today his INR is 1 .12. Ultrasound reveals a right popliteal vein thrombosis extending into the deep femoral vein. What is the best initial management step for this patient?

1. Increase warfarin dose for goal INR > 2.0
2. Start intravenous unfractionated heparin ✔
3. Initiate thrombolytic therapy
4. Place inferior vena cava filter
5. Discontinue warfarin and reassure

INCORRECT ✖

The correct answer is 2.

This patient should be started on intravenous or low molecular weight heparin, and his warfarin dose should be increased until his INR is at least 2.0. Deep vein thrombosis (OVT) management is divided into acute anticoagulation and clot stabilization, chronic anticoagulation, and treatment of DVT-related complications. Initial clot stabilization with a heparin product is mandatory. Heparin retards further thrombus formation by binding to antithrombin III and enhancing its activity; heparin stabilizes but does not lyse existing clot. Next, long-term anticoagulation with warfarin is necessary. Warfarin inhibits activation of the vitamin K dependent clotting factors II, VII, IX, and X, but unfortunately it takes at least 4-5

days for warfarin to become therapeutic, hence the need for concomitant "bridging" heparin. Lastly, patients with new OVTs should wear compression stockings to decrease the risk of developing post-phlebitic syndrome, a potentially devastating complication.
The above patient presents with a propagating clot in the setting of sub-therapeutic warfarin. This must be treated like a new, unstable clot; thus heparin must be used while his INR becomes therapeutic.
(Choice 1) This patient certainly requires an increase in his warfarin dose to reach an INR > 2.0. However, this unstable clot also requires heparin.
(Choice 3) Thrombolytics are indicated for patients with hemodynamically significant pulmonary emboli. They are not routinely used for patients with DVTs.
(Choice 4) Inferior vena cava filters may be used in patients with lower extremity DVTs where anticoagulation is contraindicated. This patient has no contraindications to anticoagulation.
(Choice 5) First-time OVTs are typically treated with anticoagulation for 6 months. Thus, it would be inappropriate to discontinue warfarin in this patient.

39. Question

1 points

A 56-year-old male complains of chronic exertional dyspnea for the past several years that has progressively worsened. He cannot remember the last time that he saw a doctor, and does not take any medications regularly. It is difficult for him to climb two flights of stairs without having to rest. His dyspnea has gotten so bad that it has severely limited his activity level, and he now spends most of his time on the couch. He also describes recurrent episodes of nocturnal dyspnea, during which he wakes up at around 2:00 AM with difficulty breathing, coughing, and wheezing that improve when he sits up. He usually coughs up some yellowish sputum before being able to go back to sleep. He has had no fever, chills, or chest pain. Which of the following is the most likely cause of this patient's complaints?

1. Left ventricular failure
2. Bronchial asthma
3. Chronic bronchitis ✔
4. Pulmonary thromboembolism
5. Pulmonary fibrosis
6. Right ventricular failure

INCORRECT ✖
The correct answer is 3.
The most likely cause of this patient's symptoms is chronic bronchitis. Along with

emphysema, chronic bronchitis is within the spectrum of chronic obstructive pulmonary disease. The vast majority of patients with chronic bronchitis are smokers, and the primary symptoms include exertional dyspnea and cough. Chronic bronchitis is defined as a chronic productive cough that has been present for at least three months in each of the past two years without an alternative diagnosis. The cough frequently is worse in the morning. This patient's nocturnal dyspnea from his coughing spells is likely caused by mucus buildup in his airways as a result of several hours of not coughing. The sputum in patients with chronic bronchitis is usually white or yellow, and an increase in the purulence of the sputum is suggestive of a superimposed infection. Pulmonary function tests should be performed on this patient to determine the degree of airway obstruction.

(Choice 1) Patients with left ventricular failure often become dyspneic at night, but this is a result of lying flat (orthopnea) as opposed to a lack of sputum clearance. Patients with pulmonary edema would also have pink frothy sputum as opposed to the yellow sputum described by this patient.

(Choice 2) Asthma can lead to cough and dyspnea, and can present at nearly any age. Asthma symptoms can often worsen as night, but this patient's history of dyspnea occurring around the same time each night that improves with mucous clearance is more suggestive of chronic bronchitis.

(Choice 4) This patient has no apparent risks for pulmonary embolism. Patients with a pulmonary embolism may have hemoptysis, but a cough productive of yellow sputum would be unusual.

(Choice 5) Patients with pulmonary fibrosis have dyspnea, but usually have a dry cough as opposed to the productive cough seen in this patient's case.

(Choice 6) Isolated right ventricular failure would not be expected to result in respiratory symptoms.

40. Question

1 points

A 62-year-old man presents to his primary care physician's office with progressive exertional dyspnea. His past medical history is significant for hypertension treated with hydrochlorothiazide and diabetes mellitus treated with metformin. He was an industrial worker for 30 years and retired one year ago. He smokes one pack of cigarettes per day and consumes alcohol occasionally. His blood pressure is 150/100 mmHg and his heart rate is 80/min. His BMI is 31 kg/m^2. Chest x-ray reveals pleural calcifications. Pulmonary function studies show the following:

FEV1: 70% of predicted
FVC: 65% of predicted
Residual volume: 70% of predicted
DLCO: decreased

Which of the following is the most likely cause of this patient's symptoms?

1. Impaired lung expansion due to pleural calcifications

2. Emphysema from smoking
3. Interstitial lung disease from occupational exposure ✔
4. Impaired lung expansion due to obesity
5. Increased pulmonary capillary wedge pressure

INCORRECT ✖

The correct answer is 3.

This patient has pneumoconiosis and pulmonary fibrosis due to an occupational exposure, likely asbestos. There are several suggestions that this is the case. First, he was an industrial worker for three decades. Second, his chest X-ray reveals pleural calcifications. (These can result from a hemothorax or empyema, but are also likely to result from asbestos exposure.) Third, his pulmonary function tests are consistent with restrictive lung disease. His lung volumes are decreased but his FEV1/FVC is high. The low Oleo also indicates impaired diffusion across the alveolar-epithelial membrane.

(Choice 1) Pleural calcifications alone will not cause respiratory compromise and the Oleo should be normal.

(Choice 2) COPD causes a decreased FEV1/FVC ratio and increased residual volume.

(Choice 4) Obesity can cause obstructive sleep apnea (OSA) and, in severe cases, obesity hypoventilation syndrome (OHS). Marked obesity can cause restrictive lung disease, but would not decrease the diffusion capacity. Restrictive lung disease secondary to obesity is unlikely in a patient with a BMI of 31 kg/m^2.

(Choice 5) Left ventricular failure can cause progressive dyspnea but will not cause pleural calcifications or restrictive disease.

41. Question

1 points

A 32-year-old woman comes to the emergency department complaining of sudden onset shortness of breath accompanied by a non-productive cough and left-sided chest discomfort that increases on inspiration. She denies subjective fever, coughing up blood, wheezing, palpitations, leg pain, and swelling of the lower extremities or any recent travel. Past medical history is significant for an appendectomy at age 15. Her medications include birth control pills and over-the-counter vitamins. She is a known carrier of sickle cell trait. Her father, age 65, has had diabetes for 20 years; mother, age 58, has coronary artery disease. She has never been pregnant, drinks alcohol socially and does not smoke. Her temperature is 99 F (38 C), blood pressure is 110/70 mmHg, pulse 130/min and respirations are 33/min. Pulse oximetry shows an oxygen saturation of 85% on 6 liters of oxygen. Her BMI is 30 kg/m2. She is alert and cooperative without cyanosis or jaundice. Her lungs are clear to auscultation. Her abdomen is soft, non-distended and non-tender. Which of the following is the best test to confirm this patient's diagnosis?

1. EKG and cardiac enzymes
2. Echocardiogram
3. Doppler ultrasound of lower extremities
4. Spiral CT-Scan of the chest ✔
5. Chest-x ray and sputum cultures

INCORRECT ✖

The correct answer is 4.

The patient described is suffering from a pulmonary embolism (PE) of a deep vein thrombosis (DVT). Risk factors for DVT include prolonged immobility, oral contraceptive use, obesity, smoking, recent abdominal or orthopedic surgery, occult malignancy and other hypercoagulable conditions, including sickle cell trait Patients typically present with dyspnea, cough, tachypnea and pain worsened with respiration. Symptoms such as hemoptysis and signs such as pathologic breath sounds are uncommon. The most definitive tests used to diagnose PE include ventilation-perfusion (V/Q) scanning, pulmonary angiography (gold standard) and spiral CT scanning of the chest Of these, the spiral CT scan is the most commonly used.

(Choice 1) EKG and cardiac enzymes can be used to assess for chest pain related to myocardial ischemia, but this patient's presentation is atypical for angina pectoris and she has few risk factors for heart disease.

(Choice 2) Echocardiography can be used to assess myocardial thickness, ejection fraction and the cardiac valves. The patient described has no signs or symptoms of heart failure or valvular abnormalities.

(Choice 3) Doppler ultrasound of lower extremities to diagnose DVT may be helpful in this setting as this patient likely has a DVT that has embolized to the lungs, but this study is not confirmatory for PE.

(Choice 5) Chest-x ray and sputum cultures are used to diagnose pulmonary tuberculosis and other respiratory infections.

42. Question

1 points

A 53-year-old male presents with progressively worsening dyspnea over a 4 month period. He also complains of decreased appetite, weight loss, and nagging epigastric discomfort. His past medical history is significant for a chronic duodenal ulcer for which he takes ranitidine on and off. He does not use tobacco, alcohol or illicit drugs. He has worked as a plumber for the past 30 years. On physical examination, his temperature is 36.9°C (98.4°F), blood pressure is 140/86 mm Hg, pulse is 80/min, and respirations are 15/min. Physical exam reveals fingernail clubbing and bibasilar end-

inspiratory crackles on lung auscultation. Chest x-ray demonstrates ground glass opacities of the lower lung fields, multiple pleural plaques, and one 3×3 cm mass in the right lung periphery. CT guided biopsy of the mass is planned. Biopsy is most likely to show which of the following?

1. Metastatic stomach cancer
2. Metastatic colon cancer
3. Metastatic pancreatic cancer
4. Bronchogenic carcinoma ✔
5. Peritoneal mesothelioma
6. Pleural mesothelioma

INCORRECT ✖

The correct answer is 4.

Individuals with an occupational history involving mining, shipbuilding, insulation, or pipe work are at risk for asbestosis. Symptoms tend to develop 20-30 years after the initial exposure. The most common clinical presentation is dyspnea without cough or sputum production. Bibasilar end-inspiratory crackles and clubbing are seen in approximately 40-50% of patients with advanced disease. Chest x-ray often reveals interstitial abnormalities of the lower lung fields consistent with pulmonary fibrosis. Pleural plaques are also seen in approximately 50% of asbestosis chest x-rays, and help distinguish this condition from other causes of pulmonary fibrosis. In addition to pulmonary fibrosis and pleural plaques, asbestosis patients are also at increased risk for developing certain malignancies. Studies have shown that asbestos exposure increases the risk of lung cancer 5-fold. This patient's weight loss is further indication that his 3×3 cm peripheral mass is likely cancerous. The most common malignancy in asbestosis patients is bronchogenic carcinoma.

(Choices 1, 2 & 3) While asbestos exposure is known to increase the frequency of many cancers, there is no definitive data indicating that affected patients are at significantly increased risk for stomach, colon or pancreatic cancers. Duodenal ulcers do not confer a strong risk for malignancy.

(Choice 5) Asbestos exposure can cause peritoneal as well as pleural mesothelioma. However, the location of this patient's mass is not consistent with peritoneal mesothelioma.

(Choice 6) Asbestos exposure is the only risk factor for mesothelioma. Despite the strong link between these two entities, it is important to know that bronchogenic carcinoma has a higher incidence than mesothelioma in patients with asbestos exposure. Furthermore, this 3×3 cm mass is in the lung field, not in the pleura as would be the case in mesothelioma.

43. Question **1 points**

A47-year-old African woman presents with two days of shortness of breath and left-sided chest pain. Her past medical history is significant for a mastectomy six months ago for breast cancer, for which she also received adjuvant chemotherapy. Her mobility has been limited recently due to progressive back pain. Her current medications include tamoxifen. On chest x-ray, there is an infiltrate obscuring the right heart border as well as a right-sided pleural effusion. Pleural fluid analysis reveals the following:

pH: 5.75
Nucleated cells: 10,050/mm^3
RBC: 1,500/mm^3
Protein: 3 .9 g/dL
LDH: 620 units/L
Glucose: 38 mg/dL

Her serum chemistries are notable for an LOH of 31 0 units/L and protein of 6 .1 g/dL. Which of the following is the most likely cause of her effusion?

1. Heart failure
2. Pneumonia ✔
3. Drug-induced lupus
4. Pulmonary embolism
5. Hypoalbuminemia

INCORRECT ✖

The correct answer is 2.

This woman has a right middle lobe infiltrate and right-sided pleural effusion concerning for pneumonia with a complicated parapneumonic effusion. There are several suggestions that this is the case. First, she has an alveolar infiltrate obscuring the right heart border, a finding consistent with right middle lobe pneumonia. Second, she has an exudative pleural effusion. (When evaluating a new pleural effusion it is critical to distinguish between transudative and exudative types using Light's criteria. An exudate will have an effusion to serum total protein ratio greater than 0.5, an effusion to serum LOH ratio greater than 0.6, or an effusion LOH concentration greater than 2/3 the upper limit of normal for serum LOH. This woman has an exudative effusion by all three criteria.) The next step is to determine whether the fluid is complicated or uncomplicated. Complicated fluid has a positive gram stain, positive culture, pH less than 7.2, or glucose less than 60 mg/dl, and requires chest tube drainage. Empyema is frank pus in the pleural space. This woman has pneumonia with a complicated parapneumonic effusion and needs antibiotics and a chest tube.

(Choice 1) Heart failure typically causes bilateral transudative pleural effusions, in contrast to this woman's unilateral exudative effusion.

(Choice 3) Drug-induced lupus may cause unilateral exudative effusions, but this woman is not taking any of the classic culprit drugs. Furthermore, drug-induced lupus does not typically cause complicated effusions.
(Choice 4) Pulmonary emboli present with pleural effusions in up to 40% of cases. The associated effusions may be either exudative (75%) or transudative (25%). Pulmonary infarction may also be present. While pulmonary emboli can cause complicated parapneumonic effusions, infection is a much more common cause.
(Choice 5) Nephrotic range proteinuria or hypoalbuminemia secondary to cirrhosis can cause bilateral transudative pleural effusions.

44. Question

1 points

A 64-year-old male presents to the ER with shortness of breath. The symptoms started one week ago with a dry cough and mild fever. His past medical history includes hypertension and exertional angina. He was hospitalized six months ago for pneumonia. He has a 35 pack-year smoking history. His blood pressure is 140/90 mm Hg and heart rate is 90 and regular. On examination, the patient is in mild respiratory distress. He uses some accessory respiratory muscles for breathing, but he can speak in full sentences. Chest auscultation reveals bilateral wheezes and crackles at the left lung base. His ABG shows:

pH: 7.36
pO_2: 72 mmHg
pCO_2: 51 mmHg

Which of the following is the most likely cause of this patient's current symptoms?

1. Congestive heart failure (CHF)
2. COPD exacerbation ✔
3. Pulmonary embolism
4. Pneumothorax
5. Adult respiratory distress syndrome

INCORRECT ✖

The correct answer is 2.

The patient described is most likely suffering a COPD exacerbation, which is characterized by an acute worsening of symptoms in a patient with chronic lung disease. COPD exacerbation is a very common cause of hospitalization in the US. Upper airway infections (bacterial or viral) are the most common precipitants of COPD exacerbations; such an infection explains the patient's week-long history of fever and cough. Patients often present

with cough and shortness of breath; a significant smoking history is common. Finding bilateral wheezes on examination, respiratory distress, accessory respiratory muscle use and a prolonged expiratory time favors a diagnosis of obstructive lung disease. Finally, the patient's ABG shows hypoxia, hypercapnia and respiratory acidosis, an ABG profile consistent with COPD.

(Choice 1) Congestive heart failure is characterized by exertional dyspnea, orthopnea and chronic nonproductive cough. Examination reveals gallops on cardiac auscultation, bibasilar crackles with basilar dullness to percussion, peripheral edema and other signs of fluid overload. Patients have hypoxemia and respiratory alkalosis with a widened A-a oxygen gradient.

(Choice 3) Pulmonary embolism presents with acute-onset dyspnea, tachypnea and pleural chest pain. Patients have hypoxemia and respiratory alkalosis with a widened A-a oxygen gradient.

(Choice 4) The presentation of pneumothorax can range from asymptomatic to severe. In severe cases, tachypnea may result in respiratory alkalosis.

(Choice 5) Adult respiratory distress syndrome can result from a variety of causes. Clinically, it manifests as acute-onset marked respiratory distress with tachypnea. Rales are present throughout the lung fields on exam, and hypoxia is severe and unresponsive to supplemental oxygen. CXR shows diffuse bilateral interstitial and alveolar infiltrates.

45. Question

1 points

A 37-year-old female with a long history of multiple sclerosis presents to her primary care physician complaining of dyspnea. She denies cough and fever but admits to right-sided chest pain. Her medical history is significant for an episode of atrial fibrillation diagnosed in the emergency department two weeks ago, which resolved spontaneously without intervention. She is wheelchair-bound due to spastic paraparesis and has saccadic speech. Her only allergy is to penicillin. On physical examination, her blood pressure is 120/70 mmHg and her heart rate is 110/min and regular. Chest x-ray demonstrates a right-sided pleural effusion. Therapeutic thoracocentesis is performed, and pleural fluid analysis reveals the following:

Protein: 3 .1 g/L
RSC count: 230/mm^3
WBC count: 150/mm^3
LDH: 220 IU/L
Glucose: 1 DO mg/dl

Which of the following is the most likely cause of this patient's pleural effusion?

1. Congestive heart failure
2. Hypoalbuminemia
3. Pulmonary embolism ✔

4. Aspiration pneumonia

5. Malignancy

INCORRECT ✖

The correct answer is 3.

This patient most likely has a pulmonary embolism (PE) from a deep venous thrombosis (DVT) in one of her immobilized legs. The fact that she is wheelchair-bound puts her at increased risk for DVT. Over half of patients with a DVT in a proximal leg vein will experience a PE, which manifests clinically with dyspnea, tachypnea and pleuritic chest pain. Arterial blood gas analysis in this setting typically shows respiratory alkalosis and a widened A-a oxygen gradient due to V/Q mismatch. Chest x-ray may be normal or show evidence of atelectasis and/or pleural effusion. When pleural effusions develop, the pleural fluid may be exudative or transudative (exudative is most common) and its composition can vary widely. While pulmonary angiography is the gold standard for diagnosing PE, in practice, helical CT scanning is the diagnostic test of choice.

(Choice 1) Pleural effusions in congestive heart failure are typically bilateral and symmetric. These effusions are transudative, with few RBCs or WBCs and a glucose concentration equal to that of the serum. Increased intravascular hydrostatic pressure is the underlying mechanism responsible.

(Choice 2) Effusions in hypoalbuminemia are similar to those in CHF. The mechanism here is decreased intravascular oncotic pressure.

(Choice 4) Aspiration pneumonia will initially cause an exudate due to chemical pneumonitis. Without treatment, the effusion may progress into a pulmonary abscess, leading to empyema with frank pus in the infiltrate.

(Choice 5) Malignancy in the lungs or pleural space can cause turbid or bloody exudates, with lymphocyte predominance of the WBC fraction and many RBCs. The glucose concentration can be variable depending on the tumor burden, but it approximates the serum value in early effusions.

46. Question

1 points

A 43-year-old previously healthy male is hospitalized for acute pancreatitis. On day 3 of his admission, he develops respiratory distress. He is transferred to the intensive care unit and intubated. His initial ventilator settings are:

FiO2: 0.8 (80%)
Respiratory rate: 10/min
Tidal volume: 500 ml
PEEP: 5 mm H_2O

Ten minutes after being intubated, the man's blood pressure is 110/70 mm Hg and his heart rate is 90/min. His arterial blood gases are:

pH: 7.42
PO_0: 105 mmHg
pCO_2: 37 mmHg

Which of the following is the best next step in the management of this patient?

1. Decrease the positive end expiratory pressure (PEEP)
2. Decrease the tidal volume
3. Decrease the FiO2 ✔
4. Decrease the respiratory rate
5. Increase the respiratory rate

INCORRECT ✖

The correct answer is 3.

Acute pancreatitis causes adult respiratory distress syndrome (ARDS) in approximately 15% of patients. In patients with ARDS, mechanical ventilation improves oxygenation by providing an increased fraction of inspired oxygen (FiO2) and by providing PEEP to prevent alveolar collapse. In the hospital setting, the arterial pO_2 provides an important measure of oxygenation. It is influenced mainly by the FiO2 and PEEP level. The arterial pCO_2, a measure of ventilation, is affected mainly by the respiratory rate and tidal volume.

The normal FiO2 at sea level is 0.21, or 21%. Patients are often provided a high FiO2 (~ 80%, or 0.8) initially in mechanical ventilation, pending the results of the first blood gas analysis. The ventilator settings can subsequently be adjusted based upon these results. (The goal is to maintain pa02 ~ 60.) An important early goal in initial ventilator management should be to decrease the FiO2 to non-toxic values. There is no strict cut-off FiO2 value for oxygen toxicity, but levels below 50-60% are desirable. In this case, the patient's initial ABG values indicate appropriate ventilation and excessive oxygenation. Thus, the FiO2 should be slowly decreased to below 60% to prevent oxygen toxicity to the lungs.

(Choice 1) Decreasing PEEP would lower oxygenation by decreasing the number of alveoli available for gas exchange. While this would address the patient's increased pa02, it would be better to decrease the FiO2 to also decrease the likelihood of oxygen toxicity.

(Choices 2, 4 & 5) Tidal volume (TV) and respiratory rate (RR) are the major determinants of pulmonary minute ventilation, which predominantly affects the $paCO_2$. This patient's initial ventilator blood gas shows a normal $paCO_2$, so the minute ventilation can be considered appropriate for his current condition. The TV and RR ventilator settings do not need to be changed at this time.

47. Question **1 points**

A 35-year-old male was involved in a motor vehicle injury and suffered serious chest trauma. A chest tube was placed for a hemothorax. 800 cc of blood was evacuated from the chest, and, after ten days, the patient was discharged home. He returns again with a low-grade fever and dyspnea. CT scan reveals a complex loculated effusion with a thick surrounding peel. A chest tube is placed; however, after 24 hours, there is little drainage, and the patient continues to have a low-grade fever. What is the next step in his management?

1. Surgery ✔
2. Streptokinase into the chest tube
3. Increase the dose of IV antibiotics
4. Place a second chest tube
5. Pulmonary consult for bronchoscopy

INCORRECT ✖

The correct answer is 1.

Empyema is an infection in the pleural space. Empyema can occur from parapneumonic effusions. They can also occur as a result of contamination of the pleural space by rupture of a lung abscess, a bronchopleural fistula, penetrating trauma, a thoracotomy, and infection from a hepatic or subphrenic abscess, or from a ruptured viscus (esophagus). One common cause of empyema is after a hemothorax. The residual blood in the chest is an excellent medium for the growth of bacteria. The individual will usually present with a low grade fever, and empyema is best diagnosed with a CT scan. When the empyema is localized, complex, and has a thick rim, only surgery is the answer. In surgery, the thick pleural peel is removed, the pus is removed, and the chest is drained. All old blood clots are drained and removed.

(Choice 2) Empyema, which is recent in onset, can be removed by fibrinolytic therapy. Both streptokinase and urokinase have been used. However, in a patient with a recent motor vehicle trauma, fibrinolytic therapy is contraindicated. In addition, the fibrinolytic usually do not have much success when the empyema is loculated and has a thick rim round it.

(Choice 3) Antibiotics are useful for early empyema. Any subacute empyema, or those which are complex, will not resolve with just antibiotic therapy. Drainage is always required. Increasing the dose of antibiotics usually does not treat complex effusions or empyema.

(Choice 4) When an empyema fails to be drained by a single chest tube, another chest tube may be placed just in case the first one is blocked. However, for complex empyema, chest tube insertion can be difficult and is best done under ultrasound or CT scan guidance. When a thick peel is present, a second chest tube usually does not work. The removal of the thick fibrinous peel in surgery is called decortication.

(Choice 5) Bronchoscopy may be required if one suspects a blockage in the airways and to help clear secretions. However, when an empyema has occurred after trauma, bronchoscopy is a redundant procedure. It does not aid in the diagnosis, nor does it help in clearing up the effusion.

48. Question **1 points**

A 40-year-old white male develops a proximal deep vein thrombosis in the left lower extremity. Detailed history, examination and lab testing fail to reveal any obvious cause or risk factor for his deep venous thrombosis. Idiopathic deep vein thrombosis is diagnosed and the patient starts a 6-month course of warfarin anticoagulation. What is the goal INR therapeutic range in this patient?

1. 1.0 to 1.5
2. 1.5 to 2.0
3. 2.0 to 3.0 ✔
4. 2.5 to 3.5
5. Greater than 4

INCORRECT ✖

The correct answer is 3.

Proximal deep vein thromboses of the lower extremity are the most common source of pulmonary embolism (PE). Patients with DVT s should be treated acutely with heparin. Oral anticoagulation with warfarin is the most common long-term therapy; warfarin should be continued at least 3 months in patients with a reversible risk factor and for 6-12 months in patients with idiopathic DVT. Warfarin inhibits the vitamin K-dependent coagulation factors (II, VII, IX, and X) of the extrinsic clotting pathway, reflected in the prothrombin time (PT). The INR is the ratio of the patient's PT to a standard international reference PT. The goal INR varies with the condition being treated. For an idiopathic venous thromboembolism (VTE), the goal INR is 2 .5 with an acceptable range of 2.0 to 3.0.

(Choice 1) An INR of 1.0 indicates that the patient's PT is equal to the normal control, with no inhibition of clotting. An INR between 1 .0 and 1 .5 is subtherapeutic for treatment of a patient with idiopathic VTE.

(Choice 4) An INR of 2.5 to 3.5 is desired in patients with prosthetic heart valves. For this patient, the range of 2 .5 to 3 .5 would be supratherapeutic.

(Choice 5) The risk of bleeding in patients treated with warfarin correlates with the degree of anticoagulation and increases substantially when the INR is greater than 4.

49. Question **1 points**

A 25-year-old man presents to the emergency room with shortness of breath and cough productive of blood tinged sputum for the past few days. He denies associated fever, arthralgias or weight loss. He has never had these symptoms before, and is extremely concerned. He has no history of recent travel or sick contacts. He smokes half a pack of cigarettes daily, and has had two sexual partners in the past six months. On physical examination, his temperature is 37.2°C (98.9°F), blood pressure is 120/70 mm Hg, pulse is 1 02/min, and respirations are 22/min. Lung auscultation reveals patchy bilateral rales. Chest x-ray demonstrates bilateral pulmonary infiltrates. His serum creatinine is 2.6 mg/dl and urinalysis shows dysmorphic red cells. Which of the following is the most likely cause of his current condition?

1. Basement membrane antibodies ✔
2. Pneumocystis pneumonia
3. Infection with acid fast bacilli
4. Pulmonary thromboembolism
5. Cardiac valve infection

INCORRECT ✖

The correct answer is 1.

This patient's renal and pulmonary findings together suggest a diagnosis of Goodpasture's disease, a condition most common in young adult males. Renal findings in Goodpasture's disease include nephritic range proteinuria (< 1 .5 g/day), acute renal failure, and urinary sediment with dysmorphic red cells and red cell casts. Pulmonary findings include shortness of breath, cough, and hemoptysis caused by pulmonary hemorrhage. Systemic symptoms (fever, weight loss, arthralgias) are uncommon. The underlying cause is formation of antibodies to the α-3 chain of type IV collagen, a protein expressed most strongly in the glomerular and alveolar basement membranes. Renal biopsy demonstrating linear IgG deposition along the glomerular basement membrane on immunofluorescence is diagnostic.

(Choice 2) Pneumocystis pneumonia (PCP) typically affects HIV patients with CD4 counts <200. Fever, dyspnea, and non-productive cough are the most characteristic symptoms. Fatigue, weight loss, and chills are also common. PCP does not involve the kidneys.

(Choice 3) This patient's cough, hemoptysis and dyspnea could represent tuberculosis (Tb), but Tb tends to also cause systemic symptoms like weight loss, fever, and night sweats. Tb infection may involve the kidneys (causing dysuria, hematuria); secondary amyloidosis causing nephrotic range proteinuria is also possible.

(Choice 4) Pulmonary thromboembolism presents with sudden-onset dyspnea. Cough, hemoptysis, pleuritic chest pain, and fever may also occur. The kidneys would not be involved.

(Choice 5) Endocarditis could potentially explain this patient's presentation, with nephritic syndrome secondary to immunocomplex deposition and hemoptysis secondary to septic emboli. However, almost all patients have prominent systemic symptoms (fever, chills,

dyspnea, sweats, and weakness), plus possible new onset heart murmur, Osier's nodes, Roth's spots, Janeway lesions, and splinter hemorrhages.

50. Question **1 points**

A 32-year-old female complains of a 'nagging' dry cough over the last 4 weeks. She says that the cough is present during the day and also wakes her from sleep at night. There is no associated shortness of breath, chest pain or wheezing. Her past medical history is significant for chronic rhinorrhea and an occasional itching skin rash. She takes no medications. Chest x-ray shows no abnormalities. One week of treatment with chlorpheniramine significantly improves her symptoms. Decrease in which of the following is most likely responsible her symptom relief?

1. Airway hyperreactivity
2. Bronchial inflammation
3. Acid aspiration
4. Nasal secretions ✔
5. Bradykinin production

INCORRECT ✖

The correct answer is 4.

Based on her history, this patient's dry cough is most likely secondary to postnasal drip associated with allergic rhinitis. Postnasal drip of nasal secretions can cause irritation and initiation of the cough reflex. In general, allergic rhinitis is a diagnosis that can be made based on history and physical examination. There is generally a background of environmental allergies.

H1 histamine blockers are widely used to treat patients with allergic rhinitis. Most are available over-the counter without a prescription. Chlorpheniramine is a specific H 1 antihistaminic receptor blocker that reduces the action of histamine on H 1 receptors, decreasing the allergic response. In addition to blocking H 1 histamine receptors, chlorpheniramine has anti-inflammatory effects by blocking histamine release from mast cells.

(Choice 2) Up to 1/3 of patients with allergic rhinitis have coexisting bronchial asthma, which is characterized by both bronchial hyperreactivity and bronchial inflammation. These patients generally give a history of wheezing, which will be evident on physical examination. H 1 histamine blockers have little effect on asthma symptoms.

(Choice 3) Acid reflux can cause upper respiratory tract irritation sufficient to cause cough. Suppression of stomach acid secretion by H2 histamine receptor blockers like ranitidine or proton pump inhibitors like omeprazole will alleviate symptoms in these patients.

(Choice 5) About 5-20% of patients treated with angiotensin converting enzyme (ACE) inhibitors develop dry cough. This is because ACE inhibition causes decreased degradation of bradykinin and substance P. Accumulation of these substances causes cough.

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